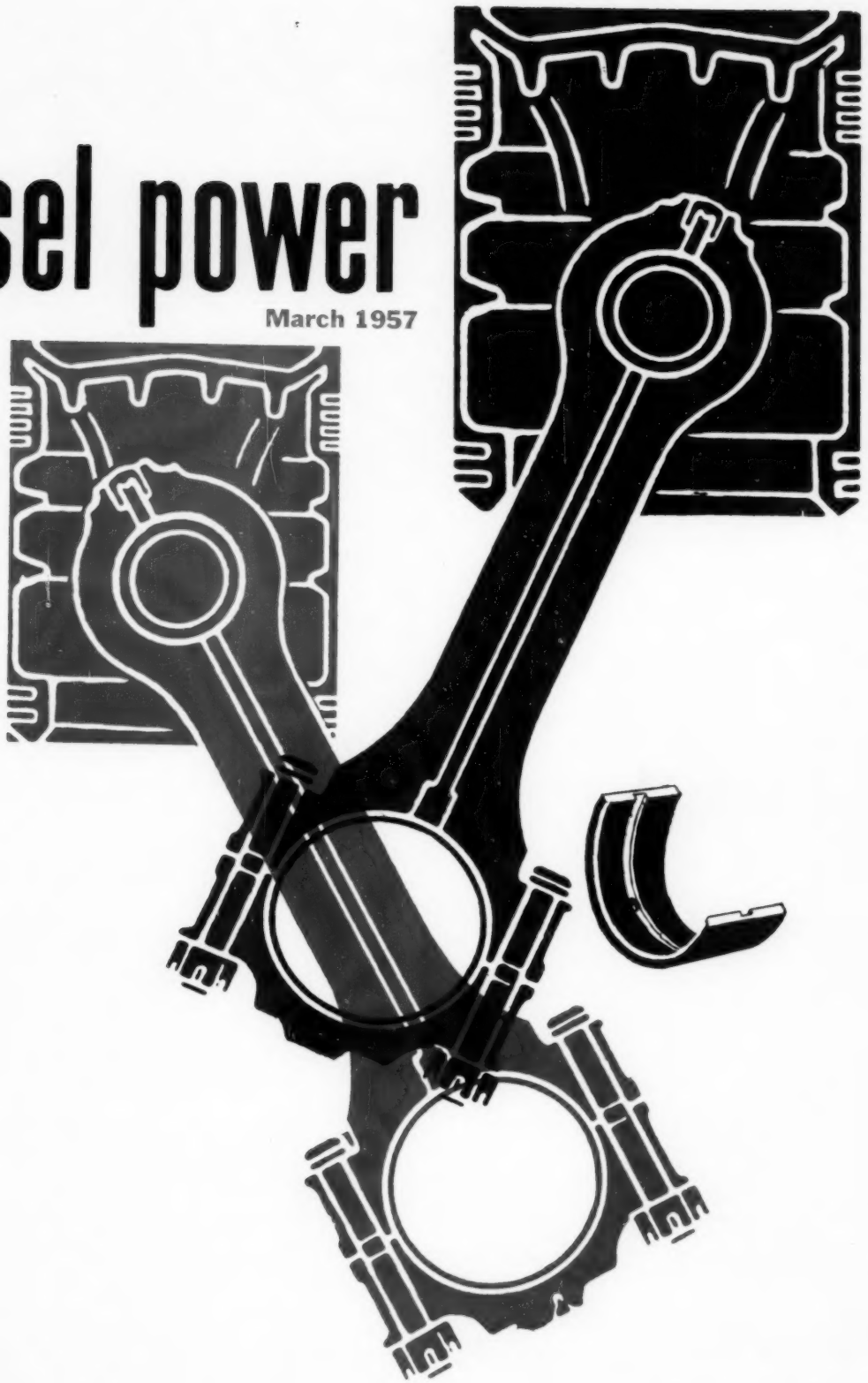
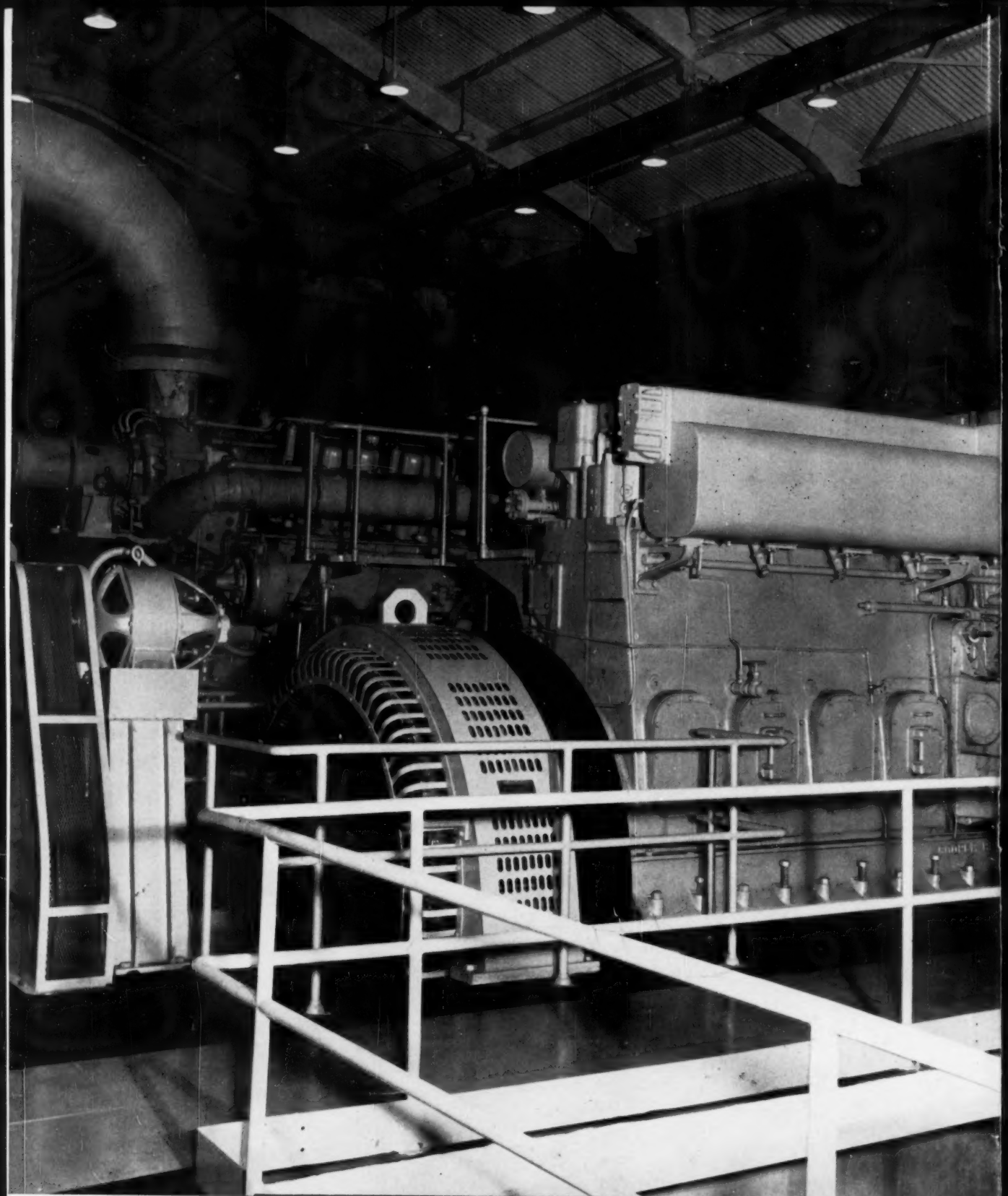
diesel power

March 1957

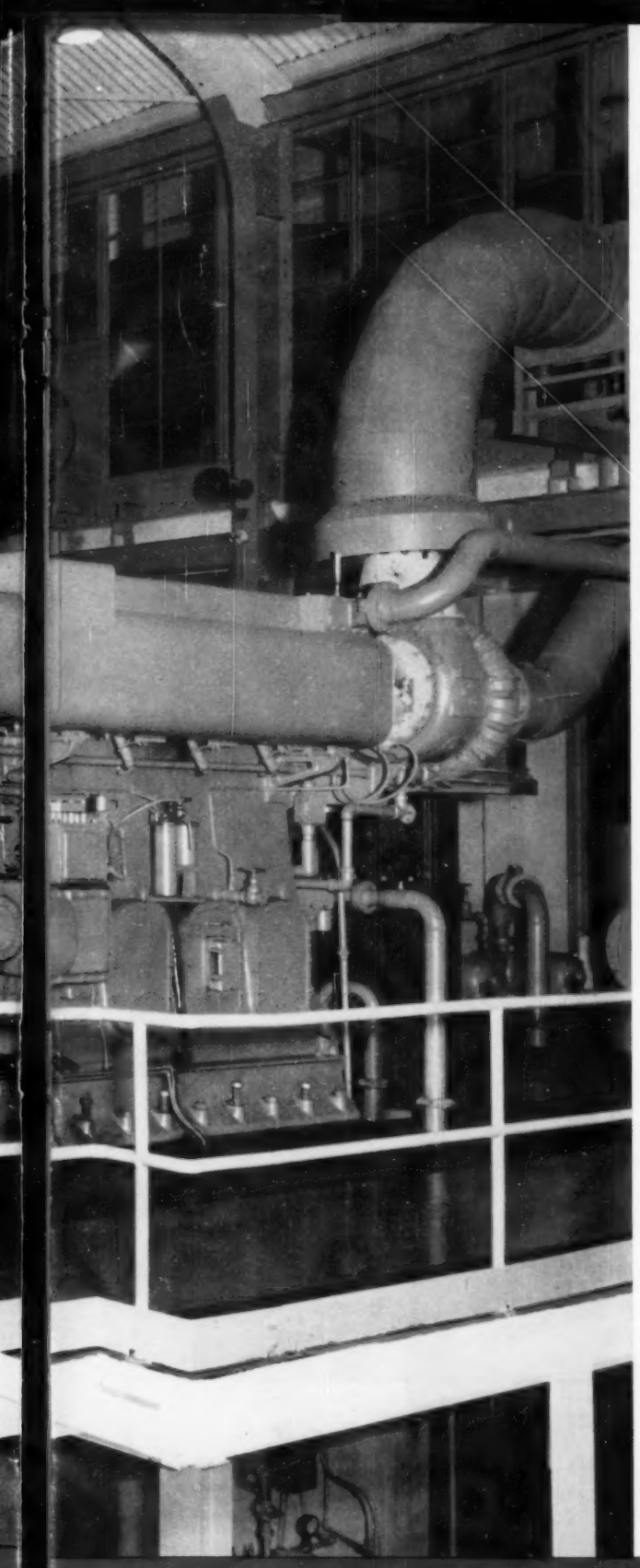




TUNE IN:
METROPOLITAN
OPERA
radio broadcasts
every Saturday afternoon

TEXACO

TEXACO



POWER PLANT OPERATORS REPORT:

MORE POWER from TEXACO LUBRICATED ENGINES

According to actual case history reports, power plant engines show a power performance improvement when lubricated with *Texaco Ursa Oils*. This is because *Texaco Ursa Oils* 1) help keep rings free for full-power compression and complete combustion, 2) resist oxidation and sludging, 3) prevent harmful deposits, 4) reduce wear.

There is a complete line of *Texaco Ursa Oils*, designed and processed especially to make diesel, gas, and dual-fuel engines deliver *more power* with *less fuel* and *longer periods* between overhauls.

For over 20 years, more stationary diesel horsepower in the U. S. has been lubricated with Texaco than with any other brand.

Your Texaco Lubrication Engineer will give you full information. Just call the nearest of more than 2,000 Texaco Distributing Plants in the 48 States or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

URSA OILS FOR ALL DIESEL, GAS AND DUAL-FUEL ENGINES

NEW TEAMWORK IN

DIESEL ENGINE

DESIGN AND PRODUCTION

Last year American MARC Inc. purchased the Diesel Division of Hallett Manufacturing Company, national leader in development and production of low-horsepower Diesel engines (especially in the air-cooled field).

The goal of this combination of two great firms was to make better lightweight Diesels for less money—an end that has already been accomplished after only a few short months!

Today the position of the American MARC-Hallett team is stronger than ever. Foreign competition in both quality and price is now met successfully by American MARC's modern mass-production techniques in the manufacture of rugged, reliable, truly All-American Diesel engines.

Scores of improvements have made standard Hallett models into revolutionary new engines. This is true particularly in the case of the air-cooled 6 HP AC1, midget prime mover adaptable to almost any application—from generators to trackless ore cars.

If you need a husky small Diesel for industrial or marine use where extra lugging power is desired, write today to American MARC for free literature and specifications on these fine engines, with their small size, low cost, and modern refinements.

AMERICAN MARC INC.

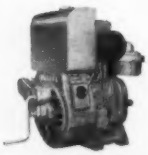
ENGINES OF QUALITY

1601 West Florence Ave., Box 549, Inglewood, Calif. • Telephone OR.8-7174

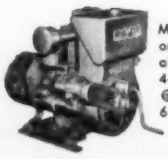
SOME desirable sales territories are still open.
Inquiries are invited from representative dealers.

- ★ **Air or Water Cooled; 5.5 to 25 hp**
- ★ **All-American, from basic materials to completed engines**
- ★ **Available as portable power units, generating plants, pumping units, or for marine propulsion**

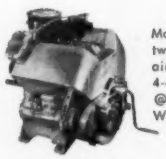
6-101



Model WC-1, one-cylinder, water-cooled, 4-cycle, 6 HP @ 1800 RPM. Wt.: 220 lbs.

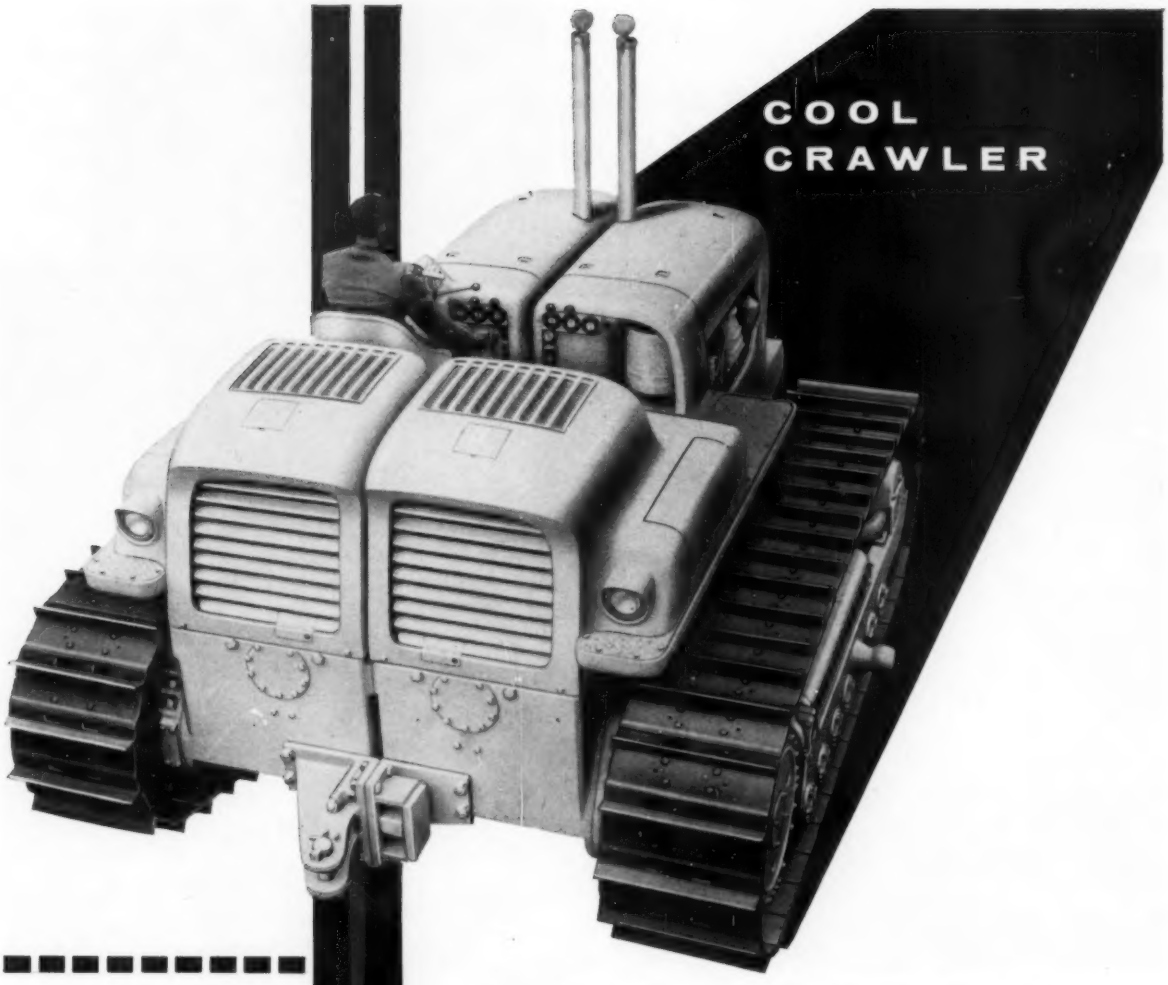


Model A1Q-3KW, one-cylinder, air-cooled, 4-cycle, 3KW @ 1800 RPM. 6-7 HP



Model AC-2, two-cylinder, air-cooled, 4-cycle, 14 HP @ 1800 RPM. Wt.: 350 lbs.

Model AC-1, one-cylinder, air-cooled, 4-cycle, 6 HP @ 1800 RPM. Wt.: 220 lbs.



TEMPERATURES
MADE
TO
ORDER

"EUC" TC-12 Handles Any Job . . .
And Harrison Handles The Heat!

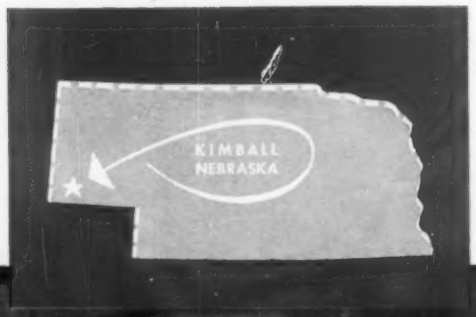
This Twin Crawler takes it cool . . . as Harrison cracks down on the heat! Pulling heavy construction equipment or moving the earth at top speeds . . . Harrison holds the line on heat. That's why Euclid specifies Harrison oil coolers. They know that for the long haul Harrison heavy-duty, high-capacity cooling equipment can't be beat. They know from long experience that Harrison products are engineered and built for dependable, durable, economical service. In fact, Harrison heat control products are backed by more than 45 years of research and manufacturing experience. If you have a cooling problem, look to Harrison for the answer.

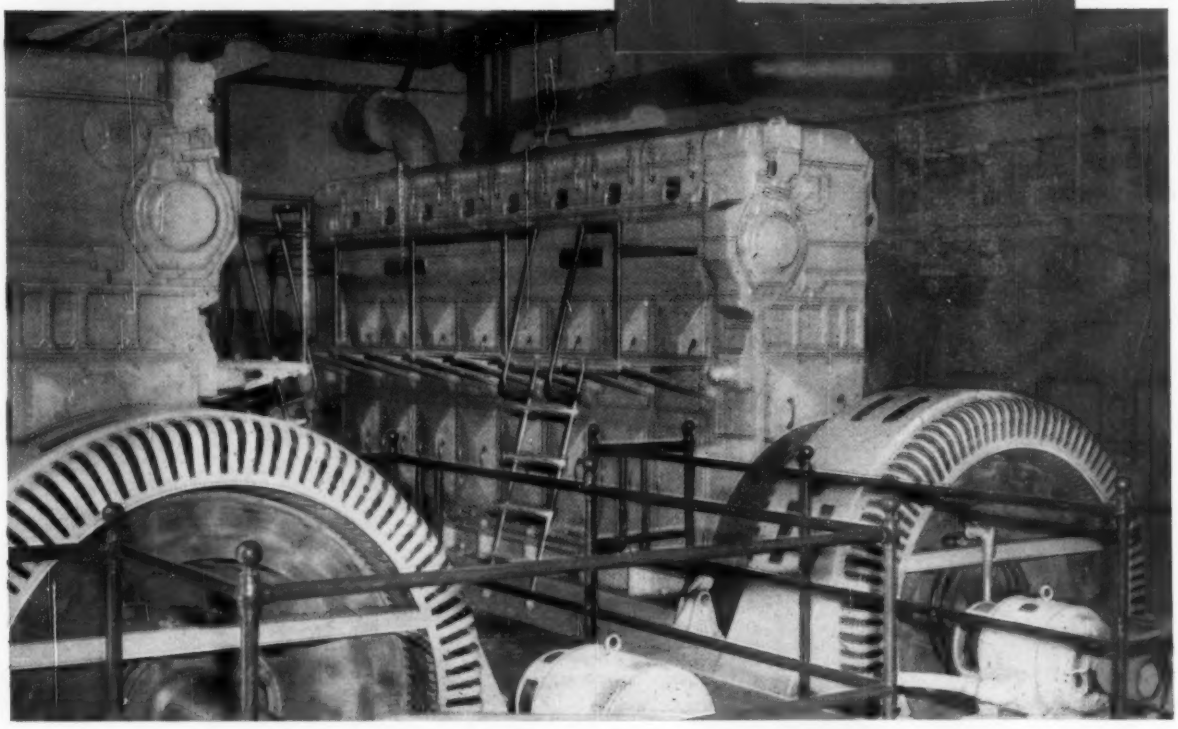
GM GENERAL MOTORS

HARRISON

RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N.Y.

Kimball's power plant saves $58,000 yearly!





powered by . . .

SUPERIOR DUAL-FUEL ENGINES

Six years ago, fast-growing Kimball, Nebraska decided to modernize its inadequate power plant. Today, powered by three Superior Dual-Fuel Engines, Kimball's power plant is saving $58,000 a year over private utility rates. The engines operate with natural gas at an average cost of 6.93 mills per KWH. On diesel fuel alone power costs are 10 mills per KWH, and annual savings would be $35,000.

The first engine paid for itself in savings in less than three years! Repeat orders later demonstrated the confidence of Kimball city fathers in Superior engine quality. As a further bonus, the three engines are expected to give good service for 35 to 40 years, according to the town's Public Works Director.

Such *savings, satisfaction* and long-term *service* are characteristic of White's Superior engines. See how you can participate in "Kimball-type" savings. Call or write the nearest office listed below. Let White's engineers discuss the new features of Superior and Atlas engines, ranging from 100 to 2150 H.P., for power to 1500 KW.

White Diesel

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, Ohio

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diesel power

Established in 1923 **Vol. 35, No. 3** **March, 1957**

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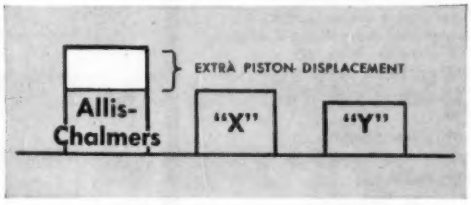
ALLIS-CHALMERS DIESELS OFFER

more USABLE power for your equipment

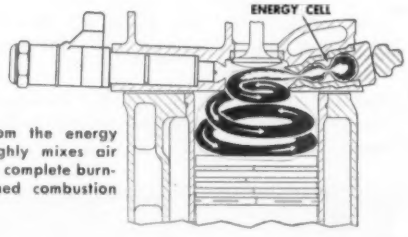
more PROFIT for you

An Allis-Chalmers 6DAS-844 diesel provides plenty of usable power for this Pacific logging truck owned by the Puget Sound Timber Co. and operating at Jordan River, Vancouver Island, B. C.

You have a new kind of engine performance with Allis-Chalmers diesels. Their big piston displacement gives you greater reserve power, higher usable torque in the normal operating range. Their unique "follow-through" combustion results in highly efficient burning — builds up compression pressure slowly, sustains it over a longer period. Result: more *usable* power.



Allis-Chalmers' big piston displacement gives you extra usable power.



A blast from the energy cell thoroughly mixes air and fuel for complete burning, sustained combustion pressures.

Equipment must be *working* to be *earning* — Allis-Chalmers engines earn more because they are on the job working more. Rugged, simple construction, with fewer parts, means a minimum of maintenance. Get the complete story of why Allis-Chalmers engines give you more usable power, more profit. See your Allis-Chalmers engine dealer.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

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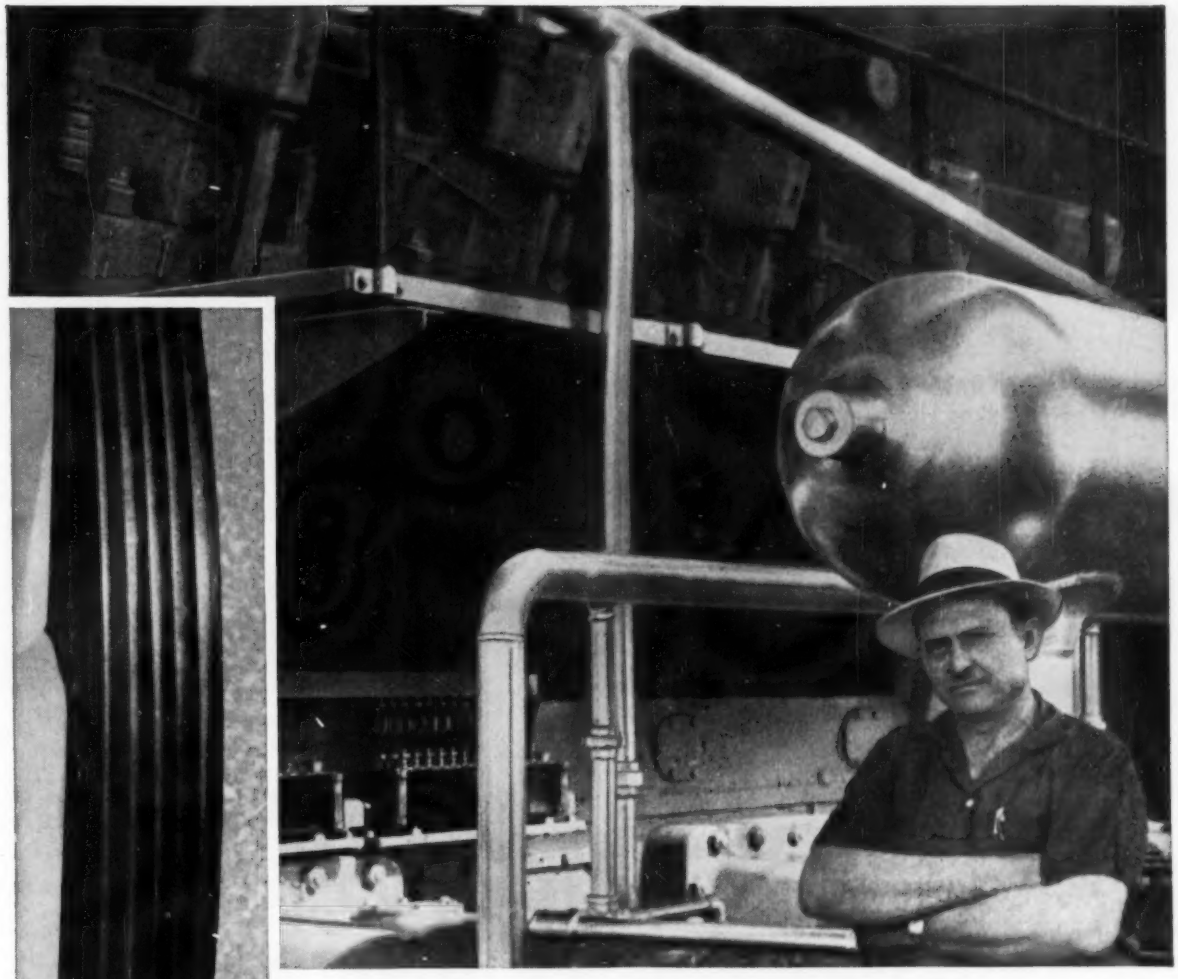
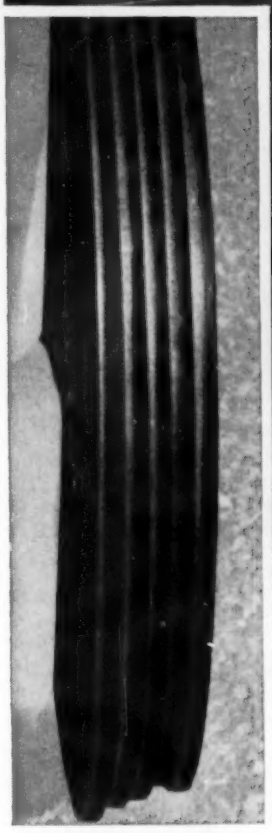




Long, Long Wear and Completely Dependable Performance from

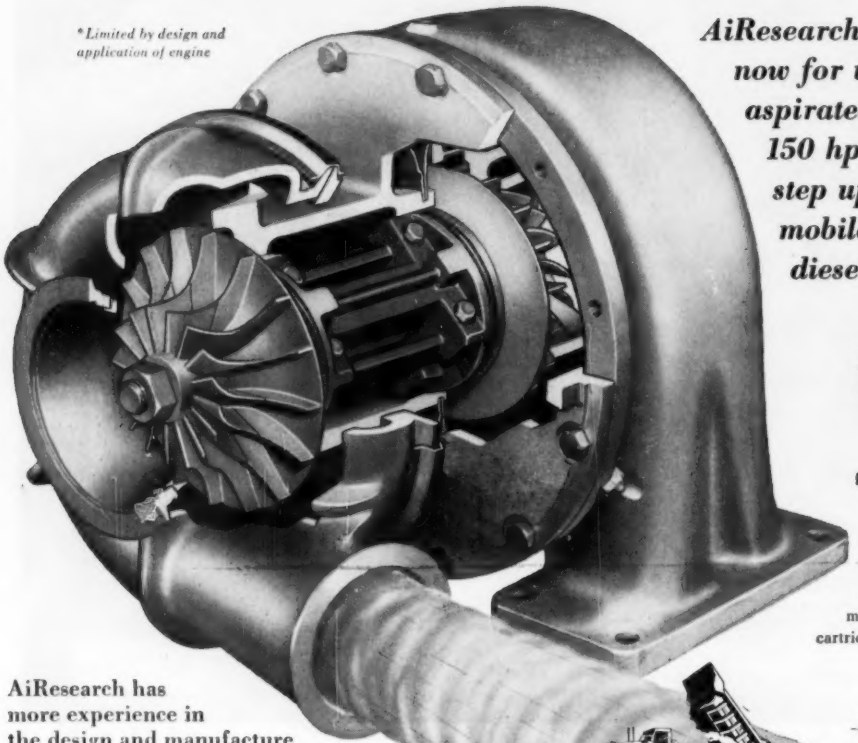
Pedrick PISTON RINGS

The Michigan-Wisconsin Pipe Line Co. is another user of Pedrick Engineered Sets of piston rings to prove this. E3905 Sets are installed in Cooper-Bessemer GMW-10 natural-gas engines at the Edgar G. Hill compressor station at Guymon, Okla. Harry Crouch, superintendent, stands beside one of these engines in the picture above. The picture to the left is from an unretouched photo of five of the taper-face compression rings recently removed from the engine during routine maintenance. The bright surface is the area of wear. Note that it does not go even half way across the face of the rings after 27,000 hours of steady round-the-clock operation at full load! That's less than .0025 in. radial wear. The Pedrick *conformable* Formflex oil rings in this installation showed equally low wear. The rings still are in condition to give more than double the length of service already achieved! If you want to be more sure of minimum wear of rings and cylinder liners, if you would like to cut your lube-oil consumption to the bone, if dependability of performance under full load without interruption is important to you, then use Pedrick Engineered Sets of piston rings in your engines from now on.

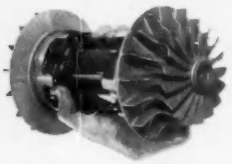
WILKENING MANUFACTURING CO., Philadelphia 42 and Toronto 2

AiResearch Turbochargers improve diesel engine performance up to 100%*

**Limited by design and application of engine*



AiResearch units are available now for use with normally aspirated diesel engines of 150 hp and up. They step up performance of both mobile and stationary diesels, land or marine.

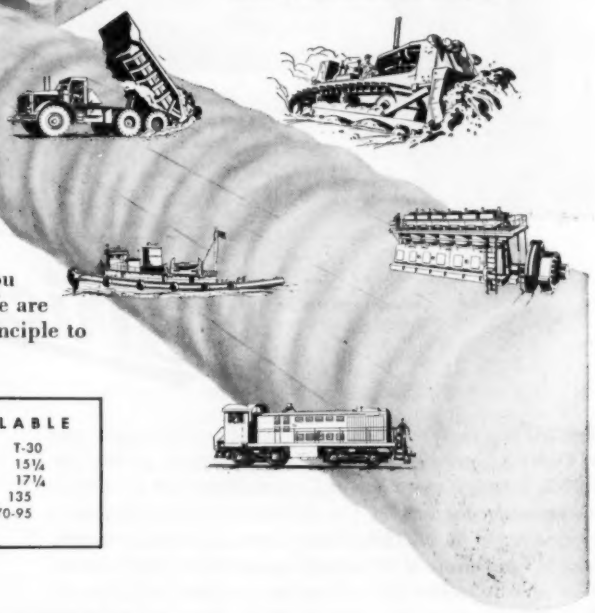


Removable cartridge simplifies repair and overhaul

This cartridge contains the turbocharger's rotating assembly, bearings and seals in a factory balanced package. It can be replaced in minutes with another factory balanced cartridge by a mechanic on the scene.

AiResearch has more experience in the design and manufacture of small turbomachinery than any other company. AiResearch turbochargers are the most efficient and safest units of their kind. New additions to the AiResearch family of turbochargers have widened their range of application in the diesel engine industry.

Our engineers welcome the opportunity to work with you in improving the performance of your diesel engines. We are happy to confer on applications of the turbocharger principle to your power plants.



AIRESEARCH TURBOCHARGERS NOW AVAILABLE

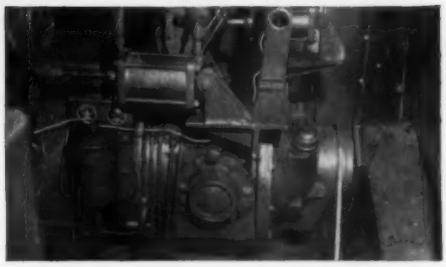
MODEL	T-10	T-15	T-16	T-30
Diameter — in. nom.	9	15¼	11½	15¼
Length — in.	9	16¾	15¾	17¼
Weight — lb.	39	125	100	135
Output — lb/min. (Standard Conditions)	25-40	35-65	45-65	70-95

THE GARRETT CORPORATION

AiResearch Industrial Division

9225 South Aviation Blvd., Los Angeles 45, California

DESIGNERS AND MANUFACTURERS OF TURBOCHARGERS AND RELATED MACHINERY



Torque Converter helps 36-year old crane to *another* lifetime of service!

A 36-year old locomotive crane — owned by the Northern Pacific Railway, and practically worn out from years of extended use — was recently saved from the scrap heap by a Twin Disc Torque Converter-Caterpillar Diesel Engine power package.

Originally powered by steam — when it was put into service in 1920 — this Browning 21-ton Locomotive Crane is used by the Northern Pacific Railway in its Como Shops at St. Paul, Minn., for general railroad work. This includes all types of loading and unloading with a sling and electro magnet, and hoisting work.

In addition to *cutting fuel costs 50%*, the torque converter-diesel engine combination has completely rejuvenated this venerable old crane, so that it should be good for another lifetime of service.

According to E. L. Jensen, General Storekeeper, "The Twin Disc Torque Converter is the crux to the success of repowering this old crane. Without the converter, the crane would not have been worth rejuvenating.

"With elimination of the old steam boiler, the ponderous reduction gears and the awkward shift levers — *plus* 50% savings in fuel costs, this conversion has been a decided success."

The torque converter provides torque multiplication to the exact ratio required, and permits delicate "inching" or "holding" of loads under power.

Overloads, shock loads and vibrations are cushioned *out* through *fluid* connection — protecting *both* driving and driven equipment. The results are *reduced* fuel and maintenance costs, *extended* cable life, *increased* profits.

Twin Disc manufactures *both* three-stage and single-stage torque converters as well as fluid couplings, and therefore can offer you *unbiased recommendations* as to the type fluid drives best suited for your next new cranes, or when you repower.

TWIN DISC
Torque Converters

Twin Disc Clutch Company, Hydraulic Division, Rockford, Illinois

Built by Dravo Corp.	For Island Creek Fuel and Transportation Co.	Powered by Enterprise Diesel Engines	with Bendix FUEL INJECTION EQUIPMENT

TOWBOAT RAYMOND E. SALVATI MEETS THE NEEDS OF EXPANDING COAL INDUSTRY ON THE OHIO RIVER

The new towboat, Raymond E. Salvati, built by Dravo Corporation for Island Creek Fuel and Transportation Company is truly quite a boat. In the first place, she is a giant of a vessel; second, she packs a whale of a lot of power; and third, she is an unusually handsome boat.

The Salvati is eminently well suited to meet the needs of an expanding coal industry on the Ohio River. It pushes a fleet of 20 standard 900-ton coal barges or 15 "jumbo" 1500-ton barges up the Ohio against the current on an average tow.

Powering the Salvati are two Enterprise marine diesel engines with Bendix* Fuel Injection Equipment that develop 2560 H. P.

The hull and superstructure of the Salvati are welded steel throughout. The main deckhouse, upper deckhouse and pilot house comprise the major portion of the superstructure. Quarters and lounge for the eight-man crew, a galley, mess room, machinery space, steering gear compartment and stove space are provided in the main deckhouse.

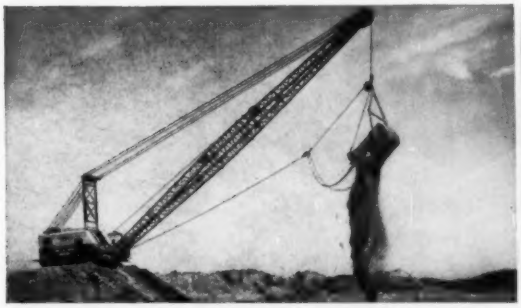
In every respect the Raymond E. Salvati is something special. And when it comes to fuel injection, something special was selected—Bendix Fuel Injection, the industry's choice for long life and low operating costs.

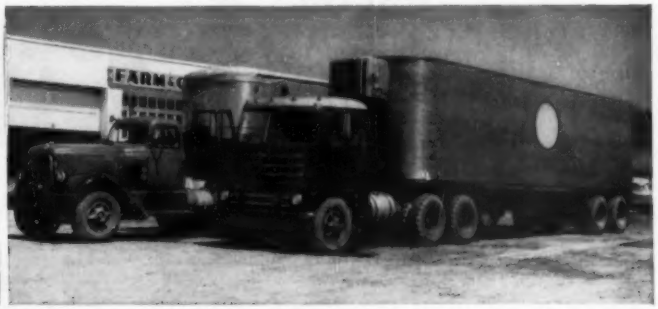
*REG. U.S. PAT. OFF.

Scintilla Division
SIDNEY, N. Y.

Bendix
AVIATION CORPORATION

For every type of diesel operation—





FOR MECHANIZED DIESELS, there's a Cities Service diesel oil for every operating condition. Most widely used is Cities Service C-300 Motor Oil, which has improved performance and lowered maintenance costs for a host of truckers, quarry operators, and mining men. Shovel above logged 16,280 hours with no repairs, no increase in oil consumption. A Cities Service Lubrication Engineer will gladly show how you can achieve similar results.

the right track to greater profits

FOR RAILROAD DIESELS, Cities Service now offers a brand new oil . . . Pacemaker RD-80. Proven superior by over 50 million miles of operation on major railroads, new Pacemaker RD-80 reduces oil consumption up to 10%, cuts engine deposits 200% better than previous oils. Also gives superior protection of ring belt area. According to a leading engine builder, its oxidation stability is "the best of any oil tested."

is Cities Service Diesel Oil!

FOR STATIONARY DIESELS, Cities Service C-300 Lube Oil has won high praise from numerous users. Example: Paulding Light and Water reports 16,587,402 H.P. hrs. without oil change; gets 23,205 BHP hrs. per gallon consumed! For more information, write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

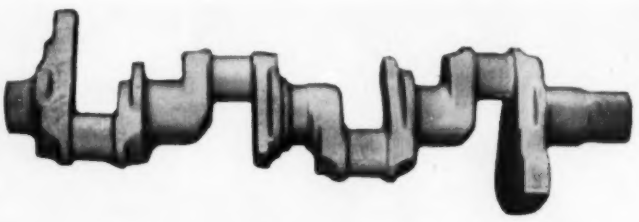
QUALITY PETROLEUM PRODUCTS

whether you think in terms of

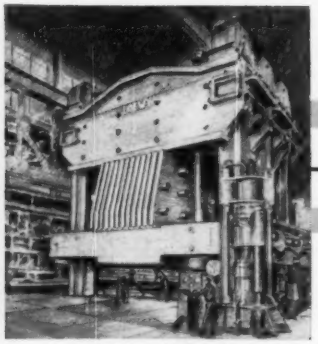
Horsepower

— or —

Thrust

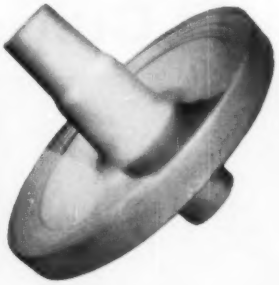


The crankshaft is the backbone of the piston-type engine. Illustrated above is the crankshaft forging for the most powerful piston-type aircraft engine ever produced.



The history of Wyman-Gordon's contribution to aircraft progress dates from the inception of the "flying machine". The jet age is now calling on the unparalleled resources of Wyman-Gordon, which include the widest range of hammer and press equipment and the greatest technical know-how in the industry. Larger and more intricate forgings than heretofore available of aluminum and magnesium are being produced on presses up to 50,000 ton capacity, and giant hammers are fulfilling the growing need for forgings of titanium, high density materials or so-called super alloys. Now, as for nearly 75 years, there is no substitute for Wyman-Gordon experience and ability for — Keeping Ahead of Progress.

At the bottom left is a turbine disc forging made from high density heat resisting alloy, and next to it is a titanium compressor wheel forging for two of the most powerful jet engines yet produced.



WYMAN-GORDON COMPANY

Established 1883

FORGINGS OF ALUMINUM • MAGNESIUM • STEEL • TITANIUM

WORCESTER 1, MASSACHUSETTS

HARVEY, ILLINOIS • DETROIT, MICHIGAN

Put This Money-Saving Idea Into YOUR Service Shop!

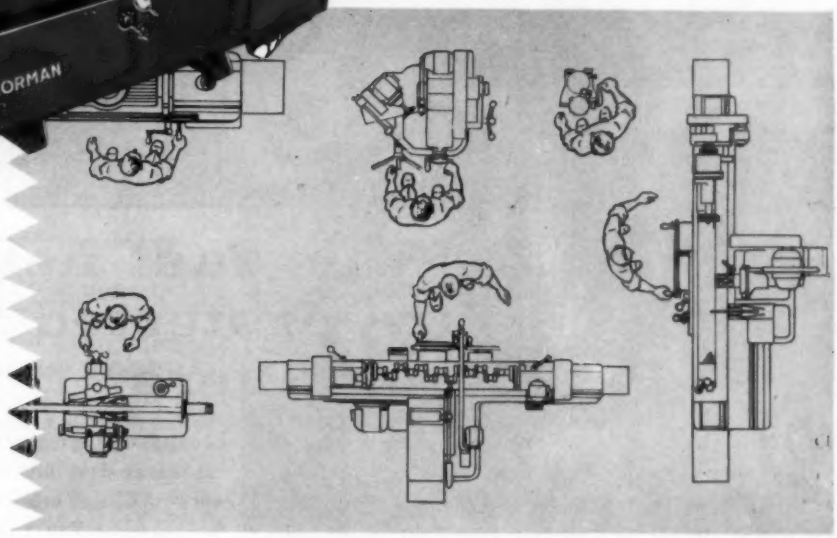
HEAD • BLOCK AND MANIFOLD WET GRINDING

Time and labor-saving engine re-conditioning in your Shop gets a tremendous start with Wet Surface Grinding facilities you can depend on! VAN NORMAN gives you the finest, fastest, automatic, Wet Surface Grinders ever built . . . proved in 7 years of constant, precision service in many Diesel Service Shops. You can put one of these big, versatile Machines into your Shop for only a few dollars a day, on an easy, "Pay-as-You-Depreciate Plan." We will show you not alone how to operate it, but how you can reduce engine down-time and increase the reliability of your overhauls. Van Norman Automotive Equipment Company, Springfield 7, Mass., U.S.A. A Division of Van Norman Industries Inc.

Write

for the facts right NOW! We'll prove to you how you can put this Wet Surface Grinder to work for you, saving time, money and labor.

There are VAN NORMAN Automatic Wet Surface Grinders from 38" to 60" capacities. All have hydraulic Quik-Clamps for quick set-up of Diesel, V-8 or overhead valve heads, exclusive "Built-in" Loading Tables for fast change-over from heads to blocks, and all do a fast, precision wet-surface ground job ABOVE the grinding wheel.



VAN NORMAN

PRECISION
VAN NORMAN
MACHINING

IN MODERN, EFFICIENT SHOPS—EVERYWHERE!

Engines for this fast new fireboat are protected by Purolator filters

Diesels on Baltimore's powerful new fireboat easily push it along at a snappy 17 mph while it discharges 12,000 gallons of water every minute. But if dirt brought in by even the cleanest fuel supply should ever get into the engines, this outstanding speed and power would quickly suffer . . . and expensive repairs would follow. That's why Purolator fuel and by-pass lube filters are included as original equipment on all engines in the ship.

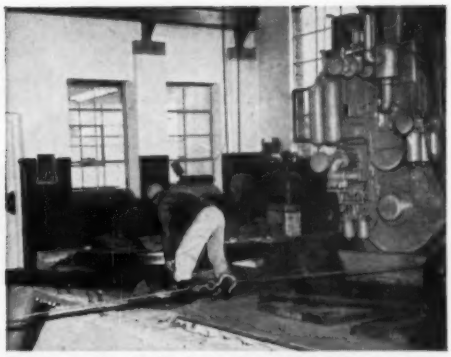
It pays for you to use Purolator filters in your diesel lube systems, fuel lines and fuel injection system. And you can't improve on Purolator Micronic® filtration because the micronic element is made of plastic-impregnated cellulose which makes it waterproof, warp-proof and unaffected by engine temperatures or crankcase dilution. It filters particles so small they can be measured only in microns – .000039 inch.

Filtration For Every Known Fluid

PUROLATOR

PRODUCTS, INC.

Rahway, New Jersey and Toronto, Ontario, Canada



The Enterprise DGSQ Turbocharged Dual Fuel engine is moved into place as a unit. With 16" bore and 20" stroke, it is rated 1422 HP at a speed of only 360 RPM.

Fourth Enterprise Engine arrives at Belleville under protective wraps of all-weather tarpaulin. This new addition adds 1000 KW to plant's capacity.

Bright Power Picture at Belleville: Better Schools and Streets, with Lower Taxes!

"We recently installed the fourth Enterprise Engine in our 100% Enterprise Dual Fuel plant. Our excellent experience with this equipment over the past eight years has proved it to be our best buy in engines. Operating and maintenance costs have been consistently low, greatly reducing power costs and helping make Belleville one of the most thriving and progressive cities in the middle west. We have better schools and streets, lower taxes, above-average recreational facilities, and many other advantages enjoyed by only very few cities of similar size."

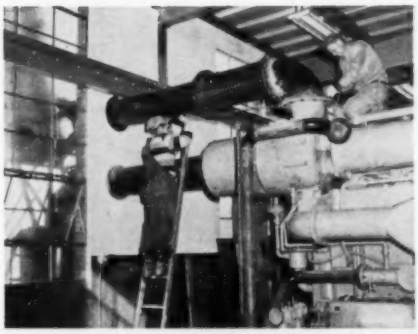
Earl E. Whitney, City Manager
Belleville, Kansas

City managers, municipal engineers, superintendents – all those concerned with the growth, the future, the prosperity of their community, can look to Enterprise Engines confident they will get this same kind of dependable and economical power-generating performance.

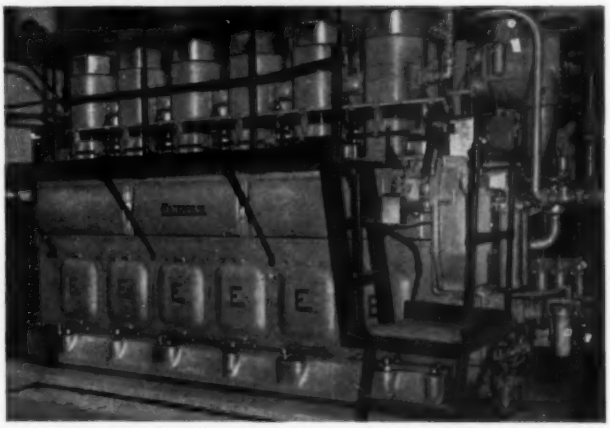
Enterprise Engines – Diesel, Dual Fuel, Spark Ignited Gas – serve every municipal need

The most modern engineering advances are reflected in every Enterprise model, from 73 to 6933 HP, for stationary or portable electric service, flood or water pumping systems, sewage plant power. See the Enterprise sales engineer in your area, or contact us direct for information or help with your plans.

Over a million horsepower at work the world over!



Installation nears completion as exhaust stack and muffler are installed. This "all Enterprise" plant, with its 2500 KW capacity, now has ample dependable reserve power for any emergency, future growth.



New member of the all Enterprise power team is cut in on the line. Low maintenance cost, excellent service record, and over-all economy of the Enterprise engines already in use were the big factors in its selection.

ENTERPRISE
dependable **ENGINES**

ENTERPRISE ENGINE & MACHINERY CO.
Subsidiary of General Metals Corporation
18th and Florida Streets, San Francisco 10, California
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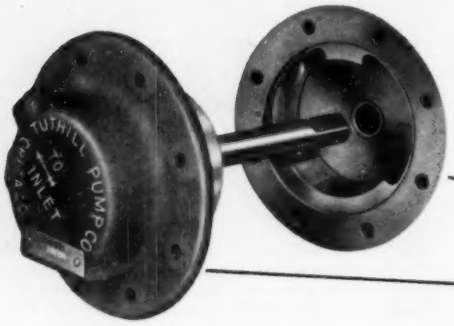
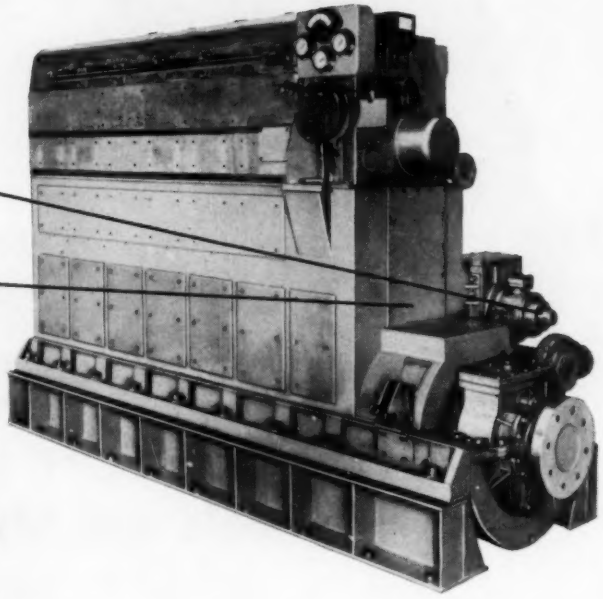
ANOTHER PUMP PROBLEM...SOLVED BY **TUTHILL**





Kahlenberg Diesels get Full Pressure Lubrication with TUTHILL PUMPS

Easy starting, dependability and simplicity of maintenance were primary considerations in the design of the new "Model E" diesel engines developed by the Kahlenberg Bros. Co. of Two Rivers, Wis.

The "Model E" engines are exhaust, turbo-charged, high output 2-cycle units, utilizing welded steel frame construction for compactness and light weight.

In an engine of this type full pressure lubrication is essential—and Kahlenberg provides it even to small remote parts. Dependable TUTHILL pumps were incorporated into the design of the "Model E" series by Kahlenberg engineers to provide the heart of the pressure lubrication system.

Since this is a dry-sump engine, two pumps are used. A Model 7 RCSA Tuthill pump provides pressure for the lubrication system, while a Tuthill Model 8 RCSA unit is used as the scavenging lube oil pump.

These Model RCSA units are stripped pumps. The mounting brackets and housings normally furnished with Tuthill pumps have been removed. Only the essential pumping elements are provided —the rotor, and the idler and cover assembly. Thus, diesel manufacturers like Kahlenberg and many others, can incorporate the dependability of Tuthill pumps directly into the design of their machinery...with the greatest possible economy of space and material...with significant improvements in appearance...at an economical price.

One of Tuthill's over 750 different models will probably answer your pump problem. Or, if a standard model does not meet your particular requirements, Tuthill engineers will work with you in developing a special modification for your purposes. Call your Tuthill representative today.

TUTHILL PUMP COMPANY
945 East 95th Street, Chicago 19, Illinois
Gentlemen:
☐ Please forward information on Series SA.
☐ Please forward information on complete Tuthill line.
NAME_____ TITLE_____
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Tuthill Manufactures a Complete Line of Positive Displacement Rotary Pumps in Capacities from 1 to 200 GPM, for Pressures to 600 PSI, Speeds to 3600 RPM.

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PUMPS FOR YOUR PURPOSE

ENGINEER'S FIELD REPORT

PRODUCT RPM DELO OIL

FIRM C. H. LAWSON, INC.

Using RPM DELO Oil heavy-duty engines outlast equipment

C. H. Lawson, Inc. operates 78 pieces of road building equipment ranging from new to 15 years old, all using RPM DELO Oil. Only one engine has ever required major overhaul and that was not due to lubrication. Firm's chief mechanic, E. C. Miller, says, "RPM DELO Oil has been used exclusively in all our heavy duty engines since 1944. In many cases, it has enabled engines to outlast the equipment." Euclid Earth Mover (above) gets a push from a bulldozer to provide extra traction in wet earth.

TD 24 International (left), one of firm's 12 bulldozers, helps clear the way for a Route 50 by-pass at Riverdale, Maryland. This two year old tractor has operated more than 4,000 hours without engine repairs. Company owner, C. H. Lawson (right), reports that RPM DELO Oil keeps the engines in his equipment in such good shape that—regardless of operating conditions—they average approximately 4 years or 10,000 hours service before even minor repairs are required.

Why RPM DELO Oils reduce wear—prolong engine life

- Oil stays on engine parts—hot or cold, running or idle
- Anti-oxidant resists lacquer formation
- Detergent keeps parts clean
- Special compounds prevent corrorosion of bearing metals
- Inhibitor resists crankcase foaming

For More Information or the name of your nearest distributor, write or call any of the companies listed below.

LUBRICATING OILS RPM DELO

TRADEMARK "RPM DELO" AND DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20

THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey

STANDARD OIL COMPANY OF TEXAS, El Paso

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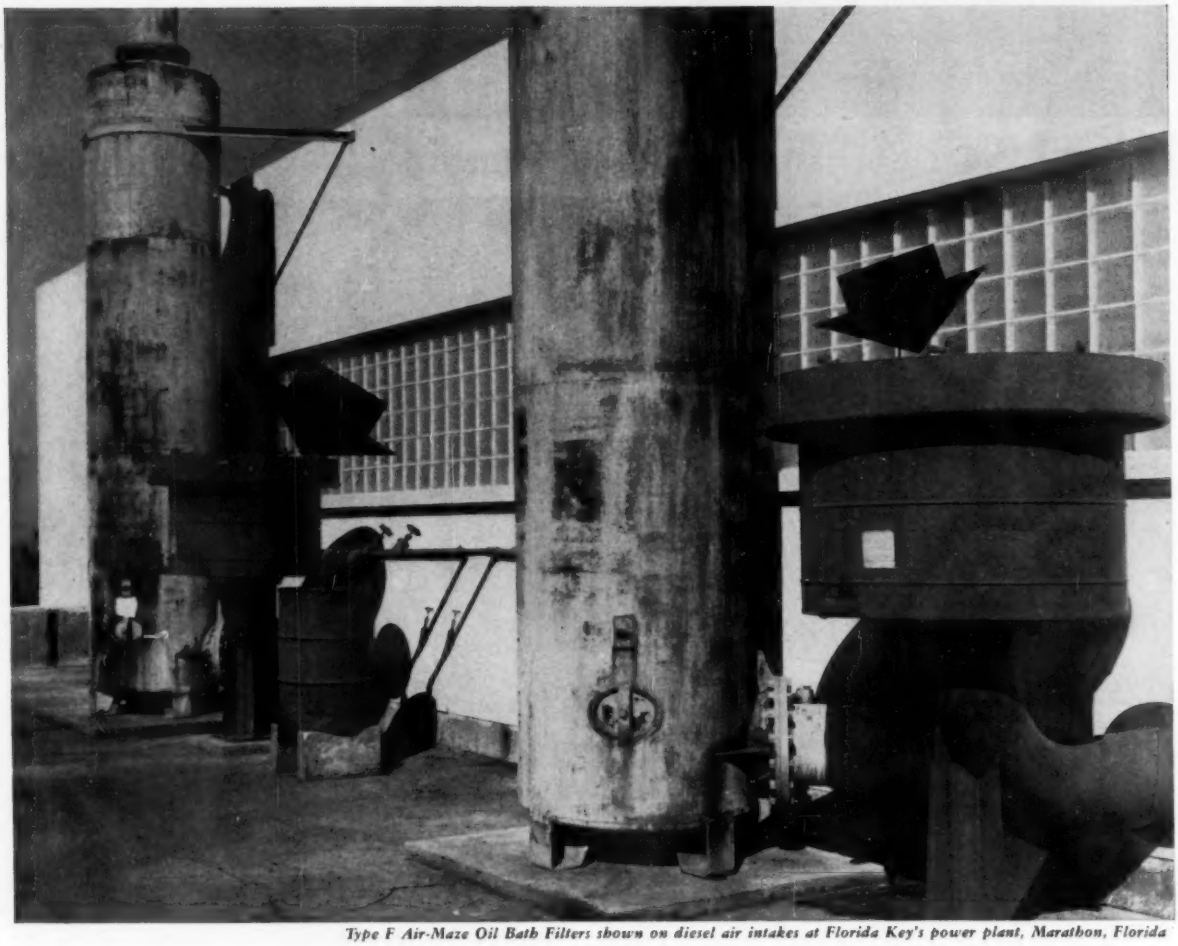


Type F Air-Maze Oil Bath Filters shown on diesel air intakes at Florida Key's power plant, Marathon, Florida

Eight types of Air-Maze air filters for every diesel engine requirement!

THE TYPE F AIR FILTER shown is only one of eight different types that Air-Maze supplies the engine and compressor industry.

For large volumes of air with extremely low pressure loss, the Automaze self-cleaning curtain filter or the LPD cylindrical type are available.

The DA dry type is selected when varying air flow is encountered or where an oil-free filter is required.

Multimaze and DH panel assemblies provide adequate impingement filtration where dirt loads are low and where low initial cost is a factor.

Type J stack type oil bath filters are designed for smaller air volumes on mobile equipment.

Electromaze electronic filter is used where submicronic dust must be removed.

To select from the widest line of industrial filters anywhere—whether for air or for liquids—check with Air-Maze first. AIR-MAZE CORPORATION, Cleveland 28, O.

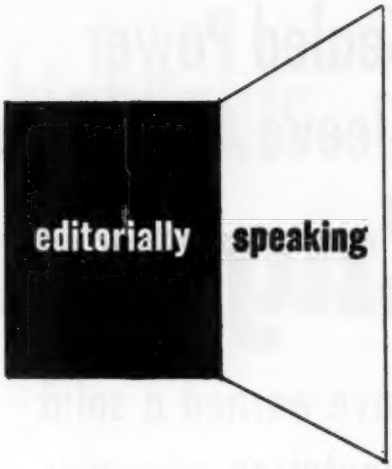
AFI MEMBER AIR FILTER INSTITUTE

The biggest names in diesels are protected by Air-Maze filters

AIR FILTERS
SILENCERS
SPARK ARRESTERS

AIR-MAZE
The Filter Engineers

LIQUID FILTERS
OIL SEPARATORS
GREASE FILTERS



About Company Policy

Definition: Company policy is that set of rules for operation that gives unity of purpose and direction toward implementation for attaining the desired objective.

Fair enough. The primary "desired objective" is to sell a product or a service at a profit—and to keep on selling it. The point of sale is generally out in the field and nothing else matters until that sale is made. The man out on the firing line gets the grassroots reaction, facing both customer and competition daily. He has to sell and keep sold. He's part of the "implementation" that the "set of rules" should back up. But do they? The answer is "yes", "no", and varying shades in between. We know that it's popular to gripe about the home office—sort of a national pastime. But too frequently we're detecting a note of bitterness creeping in. One fellow we talked to even suggested the following:

Translation: An unrealistic set of rules for operation that completely confuse and frustrate but are retained because it's easier than reevaluating them.

This too-harsh indictment has very limited validity. But there's food for thought here. The fact that such extreme views *can* exist, with their bad effect on morale and efficiency, would seem to indicate the wisdom of periodic reviews to insure that there is no reason for them to exist. Company size does not matter; the bitterest commentary heard came out of a company with about 30 people. Review communications also. Management must base policies on other factors—manufacture, materials, design, labor, etc.—as well as on the field situation. But is the "why" of policy getting down to the field? For best teamwork, it should be. If policies are not keeping pace with the rapidly changing field situation, bring them up to date. We're not pointing the finger; it's just that we've heard a lot of rumbles. Such friction means that we are not getting the most out of our industry. So if you are envolved in or can influence company policy, at least think about this, review and make changes if necessary so that we can all get on the same team. It's good for business.

B P E

Sealed Power Sleeve Assemblies For Diesel Engines

have earned a solid reputation wherever Diesels are used

Because Sealed Power is a leading manufacturer of Diesel cylinder sleeves, Diesel pistons and Diesel piston rings, all the components of Sealed Power Sleeve Assemblies for Diesels are factory matched for top performance, and subject to Sealed Power's rigid quality control throughout.

Take the sleeves, for instance—manufactured in Sealed Power's sleeve factory at Rochester, Indiana—the only factory in the world devoted exclusively to cylinder sleeve production. Special heat-treating and machining methods and equipment result in the finest sleeves that can be made. They are used as original equipment by many leading Diesel engine builders.

Whether your requirements call for standard or hard sleeves, you will find it profitable to consider Sealed Power Diesel Sleeves or sleeve assemblies. Your inquiry is invited.

SEALED POWER CORPORATION—MUSKEGON, MICHIGAN—ST. JOHNS, MICHIGAN—ROCHESTER, INDIANA
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Sealed Power Piston Rings

PISTONS • CYLINDER SLEEVES

Leading Manufacturer of Automotive and Industrial Piston Rings Since 1911 • Largest Producers of Sealing Rings for Automatic Transmissions—Power Steering Units

highlights

Detroit Diesel would double production by 1960 if present conditions continue. This was predicted by R. F. Hunter, their general sales manager during a talk at the ARBA Show in Chicago. This division of GM has built almost ½ million engines since it was founded in 1938.

World's biggest paper bag protected LeTourneau-Westinghouse Co. earthmover enroute to the ARBA road show in Chicago. Made to order, these, the first paper sacks ever to hold earthmovers were designed to protect the machines from both the elements and prying eyes until they were put on display at the International Amphitheater. The bag measures 15 x 15 x 43 ft and weighs 113 lbs.

The same high-torque drive principle used in railroad switch engines is now applied to industrial tractors. The Dynamotive power train, developed by the Automatic Transportation Co., consists of a high-output generator direct-coupled to an engine. The generator powers a high-torque electric motor which in turn is direct-coupled to the differential pinion.

Not all crude oil in storage is available for consumption. More than two-thirds of all of the crude oil inventories reported by the Bureau of Mines of the Department of the Interior as in storage, are actually unavailable and must remain unavailable. To make transportation and refining facilities function properly all crude oil lines must be kept full. Only addition of oil at one end will cause a flow out the other end.

Total wheel and tracklaying tractors produced from January to November 1956 was 253,875. But this figure does not include garden and contractor's off-highway tractors. Of this total, 70% are gasoline engine powered, 26% diesel and 4% LPG. About 80% of this total are wheel-type tractors, (many being in smaller sizes). Of this, 82½% are gasoline powered, 12½% diesel and 5% LPG. Tracklaying tractors make up the remaining 20% of total. Of these 20% are gasoline powered, 80% diesel and no LPG's.

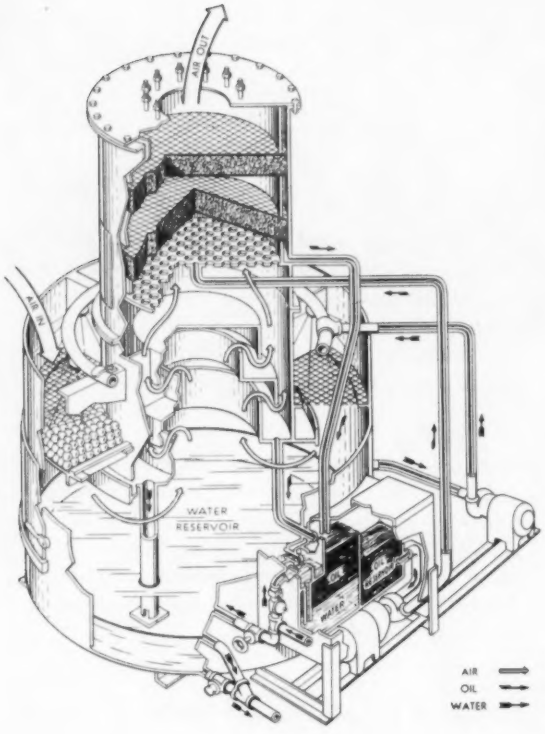
More Budd rail diesel cars are going into service all the time. The last of the three self propelled, air conditioned units ordered last year by the Jersey Central Lines has been received by them. Delivery of the 89-seat stainless steel coach brings to seven the Jersey Central's fleet of "Budd cars."

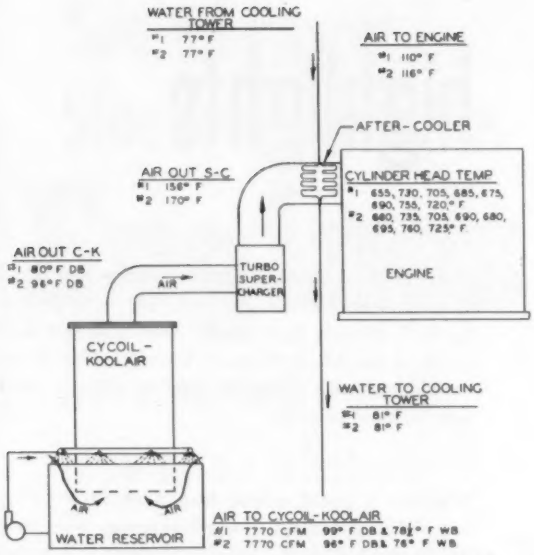
Secretaries understanding engineering language is the product of the Business Training College in Pittsburgh. The purpose of the training is to enable graduates to assist engineers who do not have time to concern themselves with details that could be handled by a secretary understanding the engineering language.

Volume of intercity general freight transported by truck during November 1956 was down 1.4% from the volume hauled during November 1956. These figures were given by the Research Dept. of the American Trucking Assoc. However tonnages hauled during the first 11 months of 1956, were up 3.6% over the same period of 1955.

The Department of Defense Reserve Award for outstanding cooperation with the reserve program of the Armed Forces, has been received by the American Trucking Association. Citing ATA and the affiliated state trucking associations and member companies, the Defense Department said the organizations' active support of the reserve program has led to the formation and sponsorship of motor transport units in 24 of the 48 states, constituting a vital part of the Transportation Corps.

One hundred fifteen new diesel locomotives were put in service by Class I railroads in January 1957. The Association of American Railroads announced in the same month in 1956, they installed 126 diesel-electric locomotive units. In December of 1956 they installed 107 diesel-electric locomotives. As of February 1, 1957, 787 units are on order. These include 755 diesel-electric, 30 gas turbine-electric and two electric units. As of February 1, 1956, Class I railroads had 835 units on order of which 808 were diesel-electric, 15 gas turbine-electric and 12 electric.





This diagram shows effect of the P16 Cycoil-Koolair when operating as a straight evaporative cooler and water from an exterior cooling tower. Condition #1 indicates spray water on. Condition #2 indicates spray water off. Spray water for #1 is 74 gpm at 77.7°F.

By tracing paths of air, oil and water as indicated by legend at lower right, operation of P16 Cycoil-Koolair is easily understood. Air cooling is accomplished in marble bed at left. Water is removed by baffles then air is cleaned as it goes through oil distribution plate in center. Oil is removed from air by filter pads above plate.

You'll get peak performance and longer service life from your engine by . . . .

Conditioning Your Engine Intake Air

By Dwight M. McMakin, Assistant Manager,
Engine & Compressor Dept., American Air Filter Co., Inc.

REMEMBER the snap and smoothness of your car's engine on some particular cool, humid evening last summer? You were getting peak performance and if you could have measured the temperature of the pistons and valves, you'd have found that they were lower than when you were running during the heat of the day.

The answer is simple—the air was right for your engine. The cool, humid air was denser and so greater weight was trapped in the cylinder. Plus the normal cooling effect of such air, the mean temperature of the cycle was lowered. So in addition to getting peak performance, you were stretching engine life by lowering the heat load.

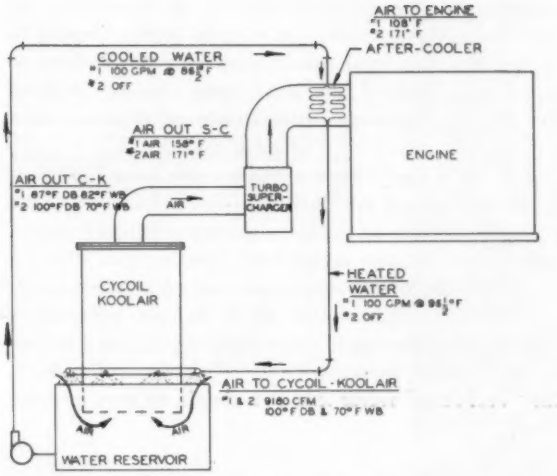
In today's diesel engines, particularly those that are turbocharged, these two considerations—weight of air trapped in the cylinder and the heat load on cylinder parts—are principal factors limiting output.

High-compression gas engines react to excessive intake air temperatures by detonating. Ordinarily reduction of the load and engine adjustment are needed to keep out of the detonation range.

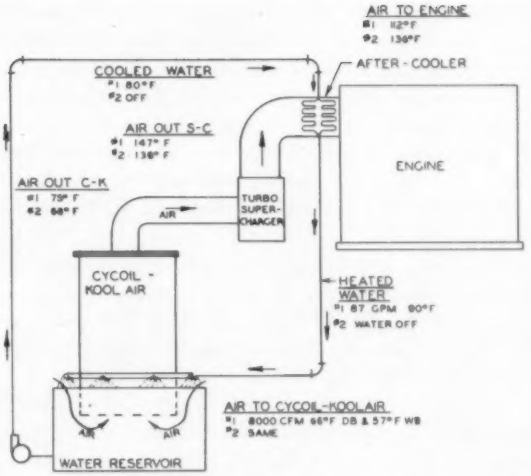
So the ability to supply conditioned air to an engine will provide peak performance and promote long life. In terms of tomorrow's engines, conditioning of the air is a designer's "tool" to permit higher outputs.

About Conditioning

In talking about conditioning of air, let's not forget that cleaning is an important phase. Take off your air



Here Koolair is supplying water to aftercooler with an ambient temperature of 100°F. Temperatures throughout system are shown with water off and on. Condition #1 means water on; #2 means off.



Same system as in preceding diagram is shown here except with ambient temperatures of 66°F and with water on and off. Condition #1 indicates spray water on; and #2 indicates spray water off.

filter or even allow a small leak in the induction piping and you'll soon see the drastic effect of airborne dirt on engine wear.

So the concept of "conditioning" should include effective air filtration. We've gone a step further and have combined all the conditioning functions into a single unit.

Evaporative Cooling

You can never consider engine intake air as being free. It always costs you something to clean it. In both normally-aspirated and turbocharged engines you pay (in engine fuel) for the pumping losses. When cooling it, you pay for both the equipment involved and its operating cost. Therefore, both an engineering and economic analysis of the various approaches should be made in the light of all the surrounding circumstances.

Direct cooling or transfer of sensible heat such as with an air-to-water or air-to-air heat exchanger is one approach. The trouble is in finding a cooling medium having sufficient temperature differential from the air to permit use of an exchanger of reasonable size. In some cases—marine service, for example—such cooling is entirely practical.

Another approach is evaporative cooling. It is one of the most practical and economical ways of reducing intake air temperatures. Design wet-bulb temperature does not exceed 82°F anywhere in the country and since we're concerned only with cooling rather than human comfort evaporative cooling is applicable wherever ambient temperatures are above 40°F.

In the evaporative process, 956 Btu per pound of water vaporized must be supplied just to cause the change of state from liquid to vapor with no increase in temperature. The result is considerable cooling effect. Air temperatures can be pulled down below ambients close to the wet-bulb temperature in the area.

The combined effect of cooling and humidification of the air is to improve combustion. This results in decreased fuel consumption. In gas engines, it is a method of controlling detonation.

During evaporation the remaining water is also cooled. This provides a source of relatively cold water for aftercooler use on turbocharged engines. The temperature differential between this water and air out of the turbocharger, particularly at high pressure-charging ratios, is normally adequate for effective cooling with moderately-sized aftercoolers.

The Equipment

The P16 and P16V Cycoil Koolair unit and its internal construction is illustrated. The "V" refers to models incorporating the "Vari-Flow" valves of which more later. These combination units can be used as pre-coolers and air cleaners (as for normally-aspirated engines) or in addition to cleaning, function to provide both pre- and aftercooling. It's a matter of hookup.

Two systems are involved in conditioning the air—the water system for cooling and humidification; and the oil system for cleaning. The air, of course, contacts both in its flow through the unit.

Water System—An operating level of water is maintained in the condition base. A circulating pump takes this water and feeds a spray ring and nozzle assembly. This spray is at the top of the cooler section and the nozzles spray downward over a marble bed through which the air centers the unit.

This bed is in the form of an annular ring and it consists of thousands of glass marbles evenly spread on a

stainless steel intake air screen. This tremendous amount of wetted surface with its thin water films provides an extensive air-contact area and promotes evaporation.

Excess water sumps to the reservoir. Any water droplets entrained in the air are removed in its passage through the baffle assembly and drained back to a separator. Here, any mixture of water and oil from the cleaner section is separated and the two fluids returned to their respective reservoirs.

Since water evaporation takes place, some makeup is necessary. An automatic or a manual valve is set to provide twice the water of the evaporation rate. Remember that this is a water cooling system and is subject to their chronic ailments. One of these is scaling.

Scale-forming materials concentrate as evaporation takes place. By adding twice the amount of water evaporated, two things are accomplished. The buildup of scaling material is continually diluted; and the operating water level is maintained. Excess water, carrying some of the scaling materials, drains through an overflow cock.

Incidentally, scaling of the marbles does not interfere with the evaporation process. In fact, it may help it.

Oil Circuit—The cleaner section of the conditioner consists primarily of a perforated oil distribution plate, a conical filter pad and a flat filter pad. A pump takes oil from the system reservoir and feeds it to the distribution plate.

Perforation size and location in the distribution place have been figured for the range of air flow rates covered by the particular size of cleaner. Oil floods the top of this plate and is entrained in the air as it flows through the perforations. As the air-oil stream impinges on the conical filter pad, the oil and oil-held dirt are retained and the cleaned air goes on through.

New oil is continually being added to the conical filter pad and because of its shape there is a continual oil flow to its perimeter. This circulating oil also carries away the dirt and because of this washing action the pad rarely, if ever, needs additional cleaning. The dirt-laden oil is caught in an annular sump and returned to the reservoir.

Because of the amount of oil in relation to the circulating rate, dirt and grit gets a chance to settle out in the form of sludge. The oil is also de-aerated and the oil-water separation function takes place in this reservoir.

The flat secondary filter pad catches any oil mist that managed to get through the conical filter.

Now about the "Vari-Flow" valves. These valves are an accessory piece of equipment that can be added to extend the lower limits of the unit's effective operating range. Principal application is in services where intake air flows fluctuate widely. You can see that positive entrainment of the oil in the air stream is necessary for good air cleaning as well as for the self-cleaning function. As air flow decreases, say with decreasing engine speed (or load in the case of turbocharged engines), a point will be reached where oil entrainment falls off and cleaning efficiency also decreases.

The "Vari-Flow" valves are hinged plates covering the distribution plate openings. They lift as the result of air flow and maintain a constant ratio of orifice opening to air velocity. This means positive oil entrainment down to about 20% of the cleaner's full rated capacity. Without them the cleaning section will maintain self-cleaning action only down to about 50% of rated capacity.

A series of sizes meet air requirements from 1500 cu ft to 20,000 cu ft per min. And where air volumes fluctuate, a single size can be made to operate effectively over a wide range. Another thing about these designs is that a low, constant pressure drop is maintained across the unit.

With relatively constant air flows, the self-cleaning feature of the filter pad insures against plugging and consequent higher pressure losses. With fluctuating flows, the "Vari-Flow" valves tend to maintain an even pressure drop.

Aftercooler Hookup

Pre-cooling increased density of the air into the turbocharger and improves compressor efficiency. However, compression and heat pickup from the turbo and air induction system will again raise the air temperature. Lower charge temperatures are desirable for cylinder cooling during scavenging, to increase charge densities and to lower mean temperatures of the cycle so that critically hot parts can live at high output. In gas engines, low charge temperatures are a means of controlling detonation.

These are the reasons for aftercoolers. The low-temperature water from the conditioner's reservoir provides an adequate water-to-air temperature differential for good heat transfer. This fact helps to reduce the size of intercooler needed to pull air temperatures down to the desired limits. In the cooling process, the water picks up heat

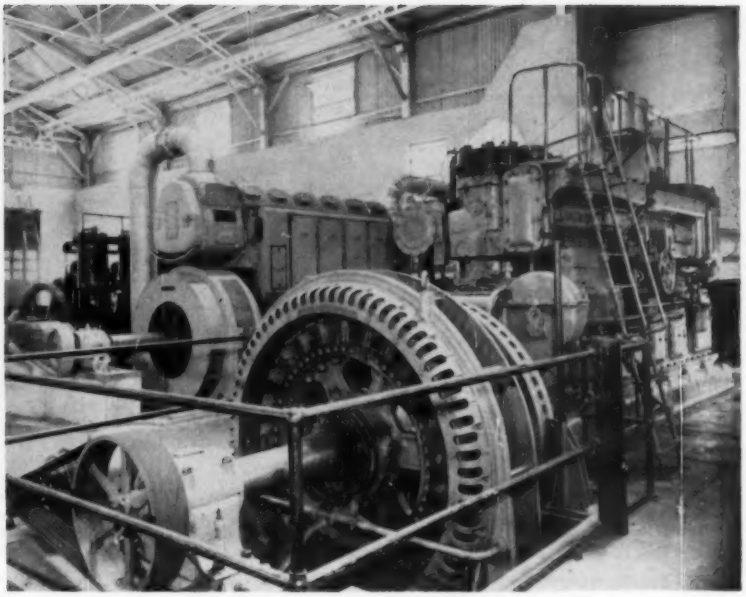
Heated water is piped back to the spray ring. The higher water temperature at the marble bed decreases the precooling effect somewhat but this is more than compensated by the aftercooling effect. The evaporative process cools the water and it is ready for recirculation to the aftercooler. Typical temperatures at different portions of the cycle are illustrated.

Summary

Conditioning of intake air is becoming more essential as engine outputs increase. High ambient air temperatures are another reason for conditioning. The concept of conditioning should include cooling, humidification and cleaning of the air.

The evaporative process is especially useful for both pre- and aftercooling. It provides an inexpensive source of relatively cold water. Using this to lower cylinder charge temperatures means that higher outputs are possible without exceeding the temperatures that cylinder parts can stand. In gas engines it also controls detonation.

We feel that the conditioning job can be done best in a single unitized design. A good many of these units are now applied in pipeline pumping, municipal power generation and other industrial services. Field reports and reorders attest their efficiency.



From right to left are four of Wauchula's five F-M diesels: the 1200-hp engine installed in 1951, the 1280-hp unit put into service in February 1955, the 360-hp diesel installed in 1932 and the 300-hp unit.

Wauchula Gets Power and Profits

Wauchula citizens get double benefits from municipal power plant—low cost dependable electrical power and substantial reductions in municipal taxes.

A DIESEL power plant is paying 70% of all government costs for the City of Wauchula, Florida out of its profits. In addition to giving dependable service, the plant has paid all its own operating and capital expansion costs out of its own revenues.

Today, the plant represents an investment of more than $\$1/2$ million with five Fairbanks-Morse diesels totaling, 3955 horsepower. Latest addition to meet the growing power demand is a 1280-hp opposed-piston diesel which went into service in 1955.

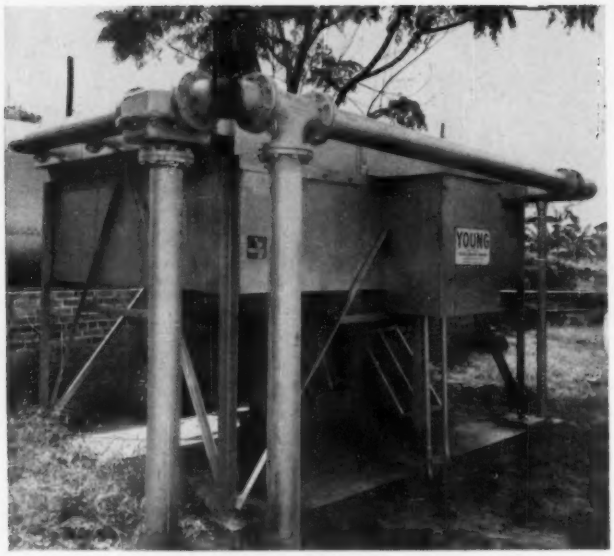
Background

Wauchula, some 70 miles southeast of Tampa, is the county seat of Hardee County, a prosperous agricultural region. Farmers supplement the good rain on this rich soil with irrigation to get two crops a year. With a population of 3500, this city is the region's trading center and also a processing center with six vegetable packers, a cannery, a feed mill and a crate factory. All are dependent on the city's diesels for power.

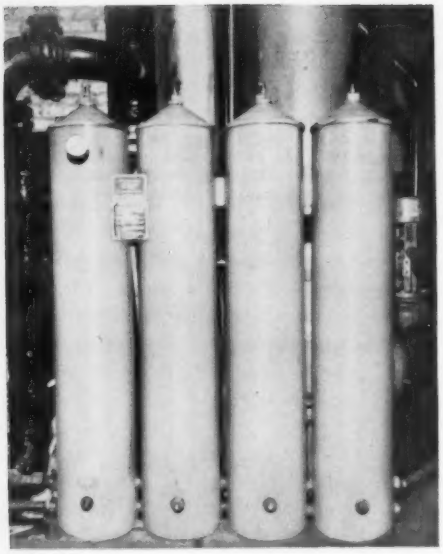
Back in the twenties, Wauchula's land promotion fever made it go through a boom and bust cycle. Until today the taxpayers are still paying off this bonded indebtedness. Every cent of the property taxes collected in Wauchula still goes to pay interest on this old debt. If the citizens also had to pay the normal government costs, the tax load would be a difficult burden.

Fortunately, the city's prosperous municipal utilities bear a major portion of the costs. In 1955, Light and Water Dept. receipts amounted to $253,010 while department expenditures were $131,397. A profit of $121,613 was left for support of other city services. This was 70% of the $173,269 spent for all other municipal expenses.

Light and Water Dept. profits paid for the fire and



Jacket cooling water for the 1280-hp opposed-piston diesel is cooled in this radiator located outside the diesel power plant.



Lube oil is bypassed from pressure system of the OP diesel through these cellulose-cartridge filters. Cooling water thermostatic valve is at right.

police departments; for paving and maintenance of streets; for sewage disposal and hauling away trash; for the city athletic park and the youth center tennis courts; for the library; for emergency airport maintenance; for inspection of meats; for trimming trees and cutting weeds; for street lights; for electricity they used; and even for perpetual care of cemetery graves. Without the diesels producing power at a profit, taxes would have to be double or more.

Plant Expands

The city was forced into electricity production to meet the citizens' needs. Originally, the city purchased power from the local crate mill. But growing demand outstripped the surplus capacity of the mill and in 1922 Wauchula installed two 200-hp Fairbanks-Morse semi-diesels in the old water works. At that time, peak loads ran up to 90 kw.

In 1925, the building was extended and a 300-hp F-M diesel was installed. This engine is still in service, the oldest unit now in the plant. Of the other four F-M diesels in service, a 360-hp unit was installed in 1932; an 805-hp engine in 1947; a 1200-hp unit in 1951; and the newest and most powerful addition, a 1280-hp o-p diesel, in February 1955. From 90 kw the load has gone up to 1750 kw and is still rising.

Growth of the load is itself one indication of progressive management. A few years ago the city decided to encourage the use of electric ranges, water heaters and other home appliances by offering free installation. The city bought the necessary materials and paid a flat fee to the electricians with total cost averaging $33.90 an installation. In two years, about 350 stoves and water heaters went in. The resulting increased use of electricity in a single year paid off the complete municipal investment.

Air conditioning and refrigeration load in summer and the industrial demand in spring and fall add to this steady domestic load. The highest peaks occur in March, April, October and November when the food packers are handling crops. This increased demand threatened to outstrip the power plant.

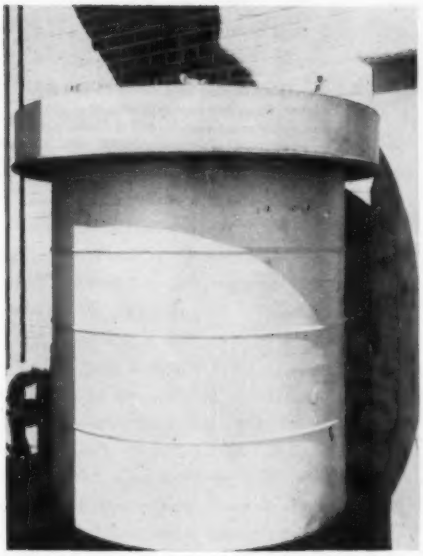
New Diesel Installed

Installation of the new diesel in 1955 restored firm capacity. If this new unit is out of service, every other engine in the plant (including the 31-year-old diesel) must be run near full capacity to carry peak load. Anticipated continuation of load development makes it essential to run the new engine to handle the peaks.

Installation of the o-p diesel in February 1955, provided more than the capacity needed to carry the load. It raised plant efficiency. Previously it was necessary to work even the oldest engines and the plant average was around 11.9 kwh per gallon of fuel.

With the new engine producing 13.5 kwh per gallon, total plant average is up to 12.46 kwh. Table I gives the figures for 1951 through 1955 and the first 6 months of 1956. The year 1952 showed the improvement effected by the 1200-hp unit and 1955 and 56 show the gain with the 1280-hp diesel.

The o-p diesel is the base-load engine of the plant, operating from 6:30 a.m. to 10 p.m. every day but Sunday. Other units are added as needed to meet the load situation. The 805-hp engine normally handles the night duty. The F-M, o-p unit is an 8-cyl, 8⅛ by 10½-in., 2-cycle diesel developing 1280 hp at 720 rpm. This compact prime mover and its 900-kw alternator sit high on a concrete



Engine intake air for the new F-M diesel is drawn through this large oil-bath type filter which is located outside the Wauchula power plant.

foundation formerly occupied by a 375-hp diesel used from 1938 to 1954.

Accessory Equipment

Accessory equipment installed with the new engine make it practically self-sufficient. Since all the other engines depend on one old cooling tower, an air-cooled radiator was provided for the o-p. Water is circulated by a motor-driven centrifugal pump through the engine jackets and the radiator located behind the plant. An automatic thermostatic valve, bypasses some water around the radiator to maintain the desired temperature.

Care is taken to keep lube oil in top condition. The detergent-type lube oil is circulated under pressure through the engine, a full-flow filter and an oil cooler by an engine-driven pump. Some oil is bypassed from the pressure system through a multi-element, cellulose-cartridge filter. A motor-driven auxiliary pump is used to bring oil pressure up before starting the engine. A lube sample is sent to the oil company for analysis every three months and reports to date indicate that the oil remains in excellent condition.

No. 2 fuel oil comes from storage through a meter and filter to a small float-controlled tank which feeds the engine's built-in fuel supply pump.

Summary

The first essential in power plant operation is unfailing service to the consumer. Wauchula doesn't remember exactly when the last outage occurred, but there hasn't been one in five years. A sound preventive maintenance program insures that the diesels are fit to serve when needed.

TABLE I

Year	Kilowatt Hours	Gallons of Fuel	Kwh./ Per Gallon
1951	3,867,900	346,060	11.17
1952	4,492,000	375,173	11.97
1953	4,926,000	414,402	11.88
1954	5,324,000	445,898	11.94
1955	6,074,220	491,720	12.35
6 Mos. 1956	3,781,000	303,370	12.46

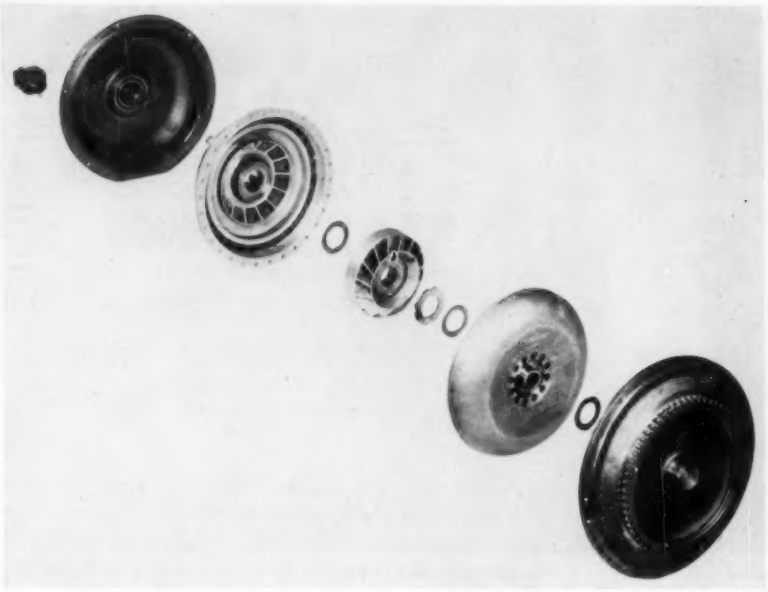
In 1955, with five engines ranging in age from brand new to 30 years, total plant cost for maintenance and repair was only $2679, an average of just 67 cents per horsepower for the year. In a year and a half, the new engine has not required any repair at all.

The plant is operated under Superintendent F. A. Dennis with Leavy Deal as chief engineer. Supervisory control is exercised by a four-man Light and Water Committee, appointed from the City Council by the council chairman. City clerk Sam Southerland handles finances for the municipal utilities.

Wauchula looks to her power plant for dependable power supply for domestic, commercial and industrial consumption. That's normal. But Wauchula also looks to the hard-working diesels for profits to support the varied municipal services that make this modern city, a safe, healthy, happy place to live.

Principal Equipment

Engine	Fairbanks, Morse & Co.
Alternator	Fairbanks, Morse & Co.
Governor	Woodward Governor Co.
Fuel Oil	Pure Oil Co.
Fuel meter	Buffalo Meter Co.
Fuel filter	Wm. W. Nugent Co.
Lubricating oil	Rubilene HD30, Sinclair Refining Co.
Full-flow lube filter	Air-Maze Corp.
Bypass lube filter	Fairbanks, Morse & Co.
Oil cooler	Kewanee-Ross Corp.
Thermostatic valves	Fulton-Sylphon Div. Robertshaw-Fulton Controls Co.
Auxiliary lube pump	Geo. D. Roper Corp.
Jacket water pump	Fairbanks, Morse & Co.
Radiator	Young Radiator Co.
Air filter	Air-Maze Corp.
Gauge panel	Fairbanks-Morse & Co.
Exhaust pyrometer	Alnor (Illinois Testing Labs.)
Alarms	Viking Instrument Company
Gauges	Marshalltown Gauge Co.
Switchboard	Westinghouse Electric & Mfg. Corp.



An exploded view of a 13-in. torque converter shows the housing, charging pump and other components. The internal components are interchangeable. Six different combinations of these internal parts are possible to specifically match the engine to load requirement.

Report on an interview to find out the background thinking, engineering development, and applicational data of .....

Long's Industrial Torque Converters

SOME time ago, the Long Manufacturing Division, Borg-Warner, started building torque converters for industrial application. This diversification trend was a natural one since Borg-Warner has probably designed and built more transmissions, particularly for automotive service, than any other firm in the world.

What are they building for industrial application? What is their thinking on the engineering approach to design and to application? How do you select a torque converter for a given application? These questions were answered by David T. Sicklesteel, a transmission specialist and an early advocate of torque converters. Since 1950 he has directed development and field testing of the "internally-changeable" type of converter to be discussed.

First, the Need

Smoothness, simplicity and torque multiplication features of torque converters, such a boon in today's automobiles, are thought by Mr. Sicklesteel to be even more important in heavy-duty applications. Proof is offered by the fact that year by year, more manufacturers are realizing this and exploiting the converter's design advantages.

If you put a rugged torque converter into the power line, an additional torque boost is applied directly to the diesel's load. Without the cushioning effect and torque multiplication feature of the converter, the whole load goes back onto the power transfer system and the engine. It's right then, at the moment of budging that heavy load, that most engines have trouble.

In field tests you can see the whole equipment struggle. It's trying; it's giving all it has but the vitally-needed torque is not available. If the operator is unskilled and uses the wrong gear ratio, matters are even worse. What's needed is an extra push, a strong, steady force urging the load into motion as smoothly as possible. That's what a torque converter does if it's designed for the job.

Long's Design Approach

Mr. Sicklesteel commented that many companies building torque converters have developed excellent designs that work well in their selected field of application. Different design philosophies and the anticipated applications have resulted in a variety of sizes, weights and degrees of complication. Also, like centrifugal pumps they are built in stages; from single to multi-stage.

In view of the requirements of different applications, engine torques to be handled, etc., a variety of converter characteristics are necessary. It's a question of how you get this flexibility.

It's easy for a designer to go off the deep end trying to build into a single type of converter all the answers to all the problems that it will encounter. The inevitable result is something that looks like a tank transmission—bulky, heavy, expensive and little understood by the men in the field who have to operate and service it.

Several years ago Borg-Warner saw this pitfall. Its engineers developed a whole new theory about converters. They created a permanently-sealed, welded-steel doughnut shape. This shape is cited as being the theoretical absolute in efficiency as it is the natural shape for such a device.

B-W engineers sought to avoid design complexity and expensive construction while still retaining maximum versatility. It was not thought practical to create a separate type or model for each engine on the market. In fact, for units of each fluid circuit diameter they retained the same external size and shape but provided for several variations of the internal components.

When they had what they wanted, the next step was manufacture. B-W's Long Manufacturing Division in Detroit tooled up a plant section to produce these standard components in varying degrees of pitch, strength and flexibility.

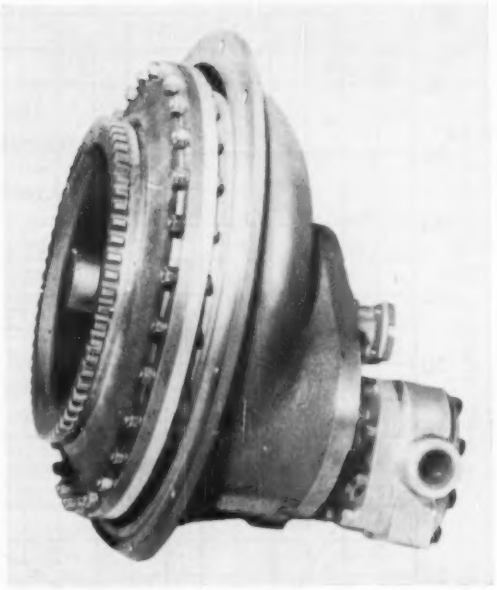
This brought standardization and interchangeability to this line of torque converters. Mr. Sicklesteel pointed out that they are producing eight standard sizes of converter shells. In each size the customer can choose from as many as six different combinations for specific matching of the engine to the load requirements.

The result, especially to owners of heavy-duty diesel rigs, is that the converter can be tailored to fit the engine and the work load. It's designed for that one job application and a specific engine torque range. It's the difference between a general all-purpose tool and a precision instrument.

Now, Selection

Discussion of "tailoring" brought up the matter of selection. Mr. Sicklesteel commented that this cencept of close matching was adopted because, in general, heavy-duty equipment is normally designed around a certain engine. If a manufacturer or a fleet owner planning major rebuilding asks what converter to use in his power line, they first ask what type of engine he's using.

They know the engine is rated in torque and horsepower output. Then they find out what the work load is—



This 13-in. Borg-Warner torque converter is adaptable to bulldozers, front-end loaders, etc. It permits use of maximum torque from smaller engines without risk of stalling engine and eliminates danger of selecting wrong gear.

perhaps climbing out of an excavation with 10-ton of rock; lifting 50-ton of gravel; walking off with six or eight Oregon spruce logs, four feet through at the butt.

Whatever it is, the load is translated into "torque multiplication factor" to show how much extra boost is required to get that load into motion without strain on engine or drive line. This factor is the maximum torque ratio (maximum input speed and torque with output shaft stalled).

Maximum torque is normally applied for seconds and as the load is moving along smoothly, the torque multiplication or ratio progressively reduces. When the torque ratio reduces to 1 to 1 (input torque and output torque equal) the converter is in the high-efficiency coupling range.

Experience in matching converters to all kinds of engines to fit specific applications has helped B-W develop a tabulated diagram which shows at a glance what the converters will do. Engine—so many lb ft torque at a certain rpm. Torque multiplication—a determined ratio. Then B-W engineers can see that they will need a certain size converter with the necessary combination of components.

Visualizing Relationships

Pressed for more details, Mr. Sicklesteel commented that they used two methods, both based on the same principles, for matching the torque converter to the engine—The "K" factor tabulating method, or use of a logarithmic torque converter absorbtion curve. In either case a suitable parameter is obtained through the use of a fundamental hydrodynamic relationship.

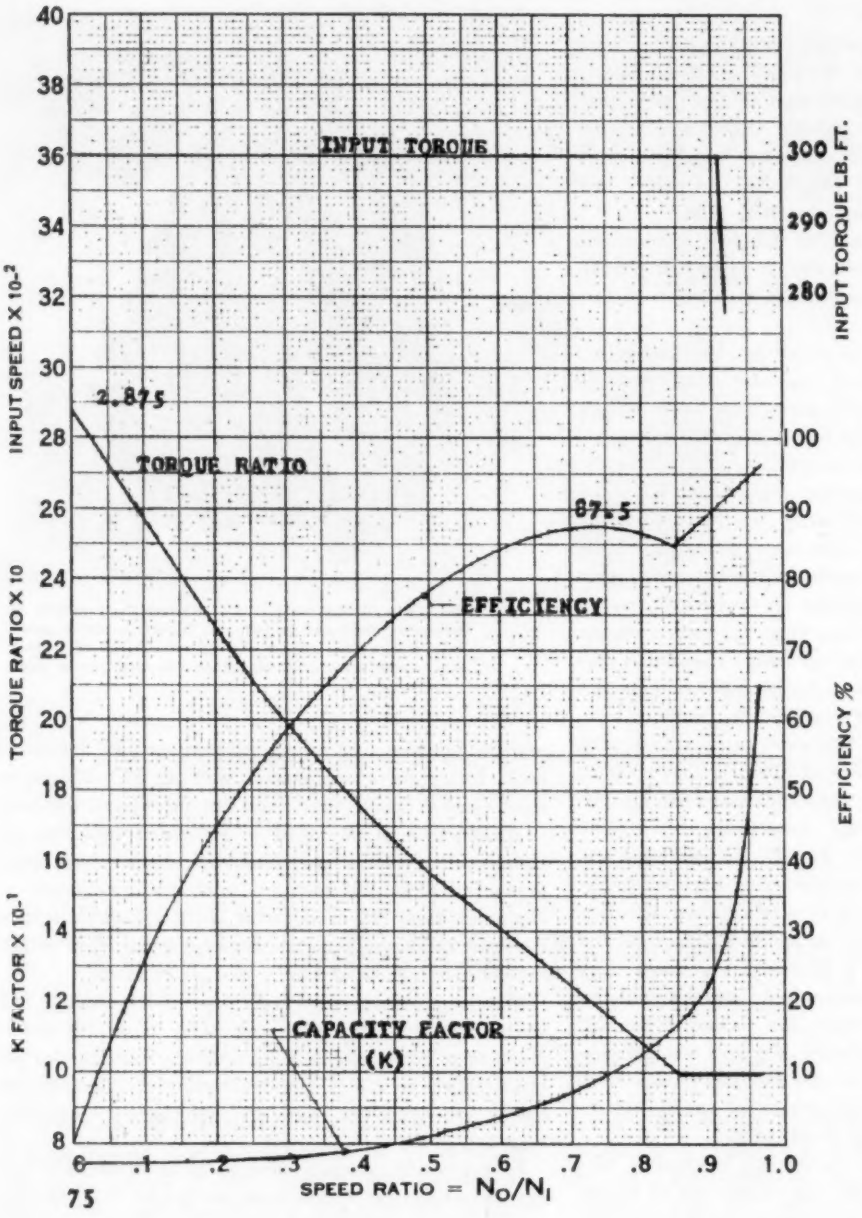


Fig. 3. Plotted characteristics of a 14-in. torque converter. Note the capacity factor or "K" value as it is plotted on the curve.

This relationship states that the torque handling capacity of a torque converter is proportional to the square of the input speed multiplied by the fifth power of the impeller outlet diameter and a factor "K" that is constant at a given speed ratio.

Dynamometer tests are used to plot the "K" values of the converter at each speed ratio and a "K" curve plotted (for an example see Fig. 3). An engine "K" curve is plotted by dividing the engine speed by the square root of the engine torque throughout the speed range. These curves can then be compared.

The principle of the logarithmic torque converter absorbtion curve is similar. Relationships derived from the basic equation show that a logarithmic plot of the capacity of a torque converter for each speed ratio at which "K" is a constant will be a straight line when the input torque is plotted against the input speed. Plotting a family of these straight lines, one for each speed ratio on logarithmic paper, gives a very handy tool for calculating converter performance.

Mr. Sicklesteel pointed out that by use of the relationships expressed in the basic equation and the "K" curve, a table could be worked out and that perhaps this table would be of value in visulizing what was going on in the

Speed Ratio	"K" Value	Engine Speed	Engine Torque	Torque Ratio	Conv. Output Speed	Conv. Output Torque	Conv. HP
0	98.7	1500	232	2.34	0	544	0
.1	99.4	1520	232	2.18	152	506	14.6
.2	100	1530	232	2.03	306	472	27.5
.3	101	1540	231	1.87	462	432	38.0
.4	103.5	1570	230	1.71	628	394	47.0
.5	107	1620	229	1.56	810	357	55.0
.6	112	1690	227	1.41	1014	320	61.8
.7	117.3	1760	225	1.26	1232	284	66.7
.8	126.5	1880	220	1.11	1504	244	70.0
.85	132.5	1960	217	1.05	1665	228	72.4
.88	138.5	2030	214	1.01	1790	216	73.8
.9	144.5	2100	210	1.00	1890	210	75.3
.91	149.5	2160	208	1.00	1965	208	78.0
.92	156.5	2250	203	1.00	2070	203	80.1

Fig. 4. Observed and calculated values show the relationship in a torque converter under many varying conditions.

converter under varying conditions. Fig. 4 is such a table. A similar table can be produced by the logarithmic curve method except that the "K" value column can be omitted.

Extending Application

The customized converters cover a capacity range from a minimum of 40 lb ft of engine torque all the way up to 2000 lb ft torque. Long also provides the means to utilize this torque or extend it. They furnish their own disconnect clutches, power takeoff clutches and shafts, 3-speed, 4-speed or any other geared transmission required, including a reverse if needed.

The whole thing is a package between the engine and load. All components that go into the drive line are engineered to match and fit each other. They've done this for automotive manufacturers for years and more recently with industrial customers.

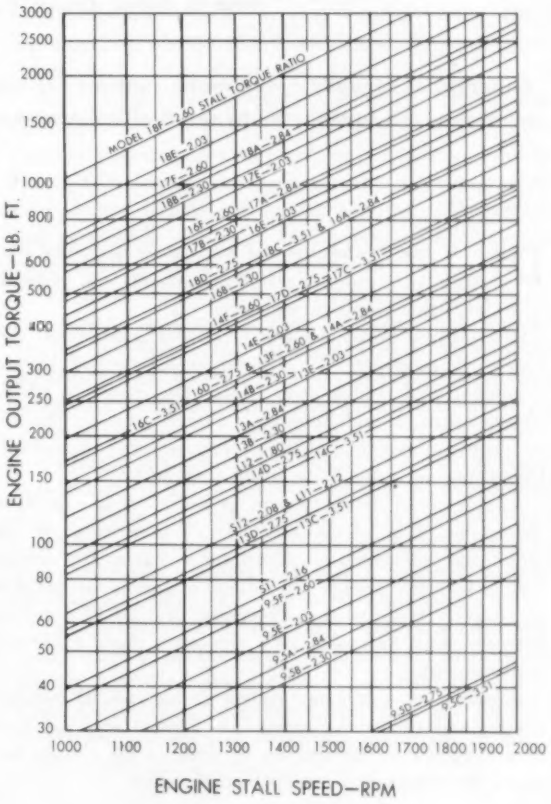
And in Conclusion

Mr. Sicklesteel summed up his comments by pointing to basic advantages of torque converter drives. Primarily, they can save the diesel user a good sum annually. He can do a given amount of work with a smaller engine by using a torque multiplication ratio designed to fit it. He can use a more compact gearbox and have less maintenance because the converter takes all the pulsation, vibration and shock loads. It adds up to longer life, less maintenance and much easier operation both for the operator and the equipment itself.

There's less need for highly-skilled, experienced operators. There is no way to wreck a converter drive line by selecting the wrong gear ratio or clutching too rapidly from one range to another. There are certain operating ranges and wide speed variations within each.

Their experience tells them that the interchangeability and standardization features are important. It permits them to produce these converters commercially so that they are not the big investment that they used to be. And any heavy-duty diesel likes such customized protection. If it could talk it would tell you so.

Capacities of different converter sizes and internal arrangements plotted against the engine's output torque and stall speed as a guide for proper selection.



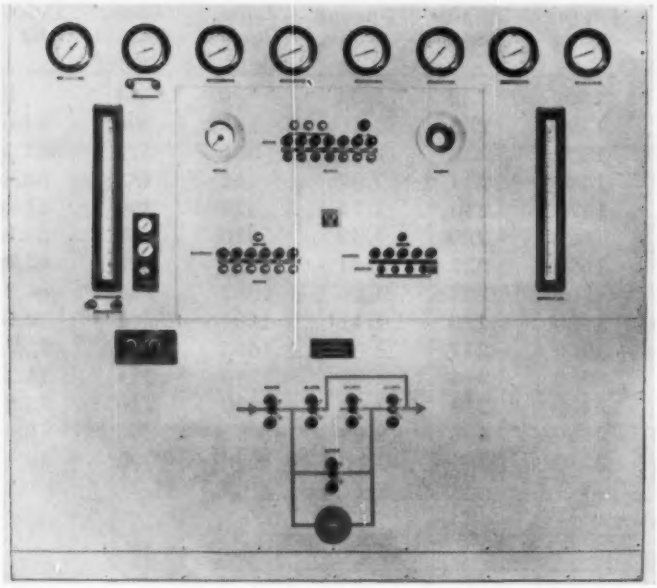


Fig. 1 shows the KVG engine-compressor automatic control system equipment installed in a single cabinet assembly. A rugged channel section frame supports main front panel, all explosion-proof enclosures and other components.

Automatic Controls Protect Your Investment

By **Devereaux Martin**, Chief Engineer, Viking Instruments, Inc.

John G. Allen, Control Engineer, Viking Instruments, Inc.

Capabilities of modern automatic controls are practically unlimited. See how control combinations can be worked out to initiate any series of actions on engines and their systems. Your need can be met too.

DIESEL engine installations must have adequate and instant protection. Capital investments are generally so large that this is a necessity.

The current industrial trend towards automation has served to accelerate the general acceptance of proper protection and control even more. The extent to which instrumentation and automatic control can be applied to protect these installations is practically unlimited. Operation can actually be made foolproof.

Engine speed, temperatures, pressures at any part of the engine, flow of coolants and of lubricants can be monitored continuously. Continuous alarm and monitoring features permit immediate diagnosis of trouble at an early stage so that preventive instead of curative measures may be taken. This minimizes down time and costly repairs.

Further, an automatic system is capable of remote control and unattended operation. This is accomplished by adding a communications or telemetering circuit between the station and remote control point.

A typical example of such an automatic control system is that for an Ingersoll Rand, type KVG, 1300-hp engine-compressor installed in the Hooper, Nebr. station of Northern Natural Gas Co. This control system was designed and made by the Viking Instruments, Inc. of East Haddam, Conn., specialists in industrial controls.

By means of initiating a "start" switching operation, this Viking Automatic Sequence Control System brings the engine into full speed condition and the compressor into full load condition automatically. Similarly, initiation of a "stop" switching operation shuts the facility down safely and automatically.

In all cases the required number of intermediate operations are established and follow a specific sequence as necessary for proper operation of both engine and compressor. Alarm and/or shutdown devices operate with the control system to provide automatic protection against dangerous or abnormal conditions.

The Viking system was designed with standard basic requirements for all engine protective equipment in mind.

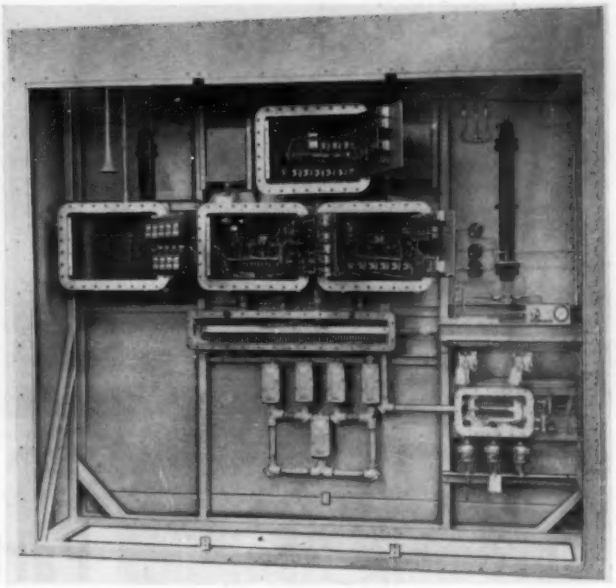


Fig. 2 shows the major groups of relays and similar items which have been mounted on swinging sub-chassis. When swung into open position, most of associated terminals are completely accessible. Color-coded wiring, numbered lead ends and circuit labelled components make maintenance easier.

That is, the system should be completely automatic in operation to eliminate the obvious disadvantage and danger of dependence upon any manual operations to maintain the equipment in ready condition. The equipment must also be fail-safe and self-supervising. These three points were carefully considered in the design and manufacture of the Ingersoll Rand panel.

The Viking system has provided and incorporates the following utility features:

(1) Completely automatic start and stop control by simple front of panel switching. This is the normal mode of operation.

(2) Completely manual start and stop control. In this manner, individual switches may be manually operated at the discretion of an operator. Thus, behavior of auxiliary components of the engine-compressor system such as oil pump, water pump and tower fan can be monitored. Manual control is also provided for compressor valves.

(3) An audible signal sounds, and a visual signal is given if an abnormal condition occurs in the engine or compressor. If the abnormal condition passes or has passed the warning stage, the shutdown feature of the control panel is activated and the engine shuts down automatically. The control panel also provides an audible signal and indicator lights which show the exact cause of shutdown.

(4) Besides visual and audible indications of abnormal and dangerous conditions, a flashing red light operates whenever an abnormal condition occurs in either the warning or shutdown circuits. In addition, visual monitoring of all critical control steps by supervisory lamps has been incorporated in the Viking system.

(5) Pressure and temperature gauges for all critical engine and compressor points; an engine tachometer; an engine hour meter; monometers for manifold pressure and fuel gas pressure; and an air pressure gauge are also mounted on the panel.

The Viking control system consists of three major circuit subdivisions, each properly related to the whole. The three are identified as "Start-Stop", "Warning" and "Shutdown" control elements.

Each group of components making up a subdivision has been separately located on the front panel. Each subdivision also has separately arranged explosion-proof enclosures. Numerous circuits interlock these major circuit subdivisions. But the categorical labelling of the sections and functional groupings are of great help in system understanding and in maintenance.

The KVG engine-compressor automatic sequence control system as shown in Fig. 1 is housed in a single cabinet assembly having dimensions 90-in. high by 104-in. wide by 24-in. deep. A sturdy channel-section frame supports the main front panel, all explosion-proof enclosures and other components.

Particular emphasis has been placed on the matter of accessibility to all components for ease of maintenance. Fig. 2 shows that major groups of relays and similar items have been mounted on swinging sub-chassis. When any sub-chassis is swung to the open position, terminals of associated components are readily accessible.

The terminals of panel-mounted switches and lamps, which extend into the explosion-proof enclosures become equally accessible when the relay panels are swung open. Color-coded wiring, numbered lead ends and circuit labelled components also contribute materially to ease of maintenance and servicing.

The motor-driven generator set at the left supplies the direct current necessary for plating. The jigs seen between the tanks at right are used for holding the cylinder liners during plating. These jigs can be seen across tank at right.

Chroming Reclaims Parts and Extends Life

Practicable application of Chrome plating restores parts to standard sizes and reduces subsequent wear rates.

CHROMIUM has many properties which make it important to railroads and other users of diesel engines. It is used for plating wear surfaces of new parts or in reconditioning old ones. Its qualities of hardness, low coefficient of friction, high melting point, and excellent heat conductivity help reduce maintenance costs.

Electroplated chromium's Brinnell hardness is 400 to 950 as compared to 140 to 350 for electroplated iron. Its coefficient of friction is one of the lowest of all metals. Its heat conductivity is 100 as compared to 24 for pure iron. It has a melting point of 3500°F as compared to 1981°F for copper. Foreign particles adhere to chrome less than to most metals.

One negative quality, non-wettability, (a disadvantage for surfaces to be lubricated) is overcome by several patented processes.

Applications

Popular chromium plating applications are on new or salvaged diesel cylinder liners; air compressor (HP & LP) liners; crankshafts; camshafts; and cast iron pistons. Procedures in reconditioning pistons differ somewhat. For example, Fairbanks-Morse pistons (C.I.) have chromium plated crowns, and tin plated skirts.

Some railroads are plating EMD and B-L-H cast iron piston skirts only with tin. This makes an effective wetting agent during break-in. It also restores pistons with slight scoring or slight wear to near original dimensions.

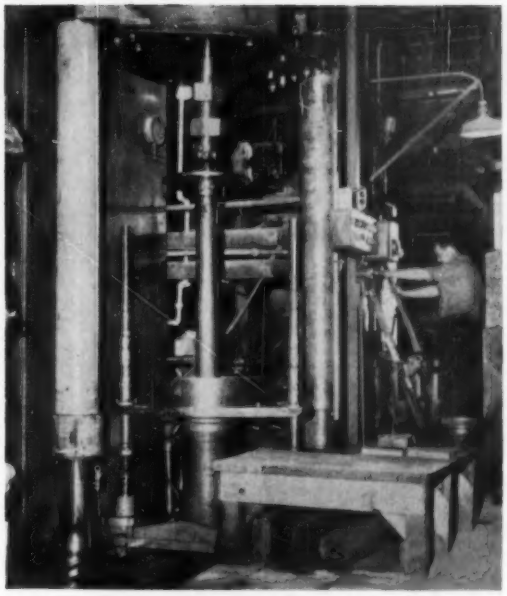
Several railroads are testing tin-zinc electroplating on the outside of cylinder liners and inside of water jackets of Alco 244 engines. This reduces cavitation erosion occuring where a certain type of water treatment is used. It also tightens liner-to-jacket fit at the rib section where fretting often occurs, possibly starting cavitation erosion.

Other parts being reclaimed by chrome plating are: EMD rocker arms and lash adjuster pockets; piston pins; blower stub shafts; governor drive shafts; idler stub shafts; blower lobe shafts; and various pins and bushings. However, due to the relatively short time these reclaimed parts have been in service, reports are limited.

In the case of diesel and air compressor cylinder liners, service experience has been much longer and the results very favorable. Let us cover the specific details of procedures followed by one principal plating company. The data discussed is from a talk given before the Southeastern Railway Diesel Club, by Mr. F. Thomas, mgr. of railway sales, Chromium Corp. of America.

There are three patented and generally recognized processes of applying chromium to cylinder liners, open grain or preblast, honeychrome, and porous-krome. All of these make the chromium plate oil retentive, thus combining chromium's wear resisting properties with adequate lubrication. Patent rights for the open grain and honeychrome processes in the U. S., are held by the Chromium Corp. of America. Patent rights for the porous-krome process is held by the Van der Horst Corp.

This Fairbanks-Morse piston has had its crown chromium plated to extend its life.



This cylinder liner is being properly sized and also checked for correct measurement.

Preparation of Liners for Plating

On receipt at plant, liners to be plated have their serial numbers recorded under name of railroad and order number. Then they're stencilled with the railroad's identification. The type of plate pattern required is next entered on the work order sheet, after which they're degreased and checked for damage.

Liners previously chromium plated are stripped to the bare iron in an alkaline solution consisting of caustic soda and other alkalis. For this operation the liner is racked, with an insi'e anode of steel rigidly held in the bore center.

Electric current is applied from the liner to the anode. This dissolves the chromium from the liner without harming the cast iron. At 6 v, 20 to 40 amps per sq. ft are required for 2 to 5 hours per liner.

If a liner has had an aluminum piston seizure it must be soaked in strong caustic for days until the aluminum fused to the bore gradually dissolves.

Following stripping, liners are measured to determine the minimum boring or honing necessary to put the bore in a round and straight condition for plating. After an estimate of the metal to be removed is noted on its record card, the liner is sent to the honing department.

Specially designed honing machines do the job. Honing stones are then selected (grade and type) according to kind of material to be honed, and the amount and speed of stock removal desired.

Stones are then cemented into special holders locked into slots in the honing head. Stone pressure against the work is regulated either manually or hydraulically. Coolant floods the work during all honing. The liner bore is inspected and checked at frequent intervals during honing. When the proper amount of stock has been removed, the liner is measured to determine if size, roundness and straightness of bore is correct.

The amount of plate required for standard bore is then recorded, liner is degreased, and sent to blasting department. Up to this point the preparation is the same for either the open grain or honeychrome process.

Open grain plating is immediately preceded by a thorough blasting of the liner bore. This is done in a special machine by the centrifugal action of a selected grade of carborundum grit to give the desired porosity pattern. This blasting thoroughly cleans the liner bore and gives the best possible surface for a firm adherent plate. It probably also has the effect of stress relieving liner bore. As soon as possible, not over 2 or 3 hours, the liner is racked and ready for plating.

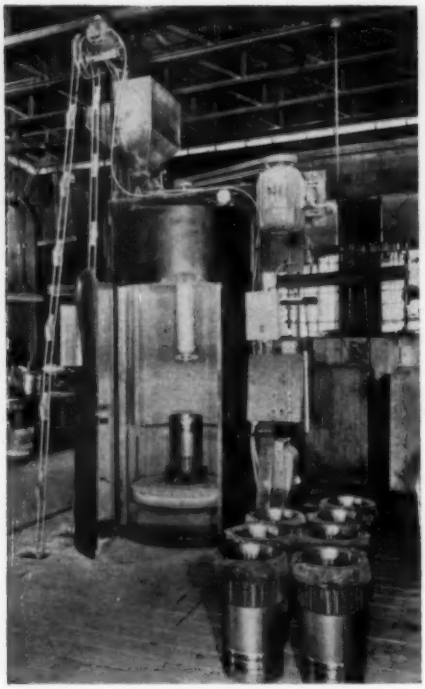
Plating Operation

Plating racks are of heavy construction to hold the liner rigid, to make good contact and to carry the large current required.

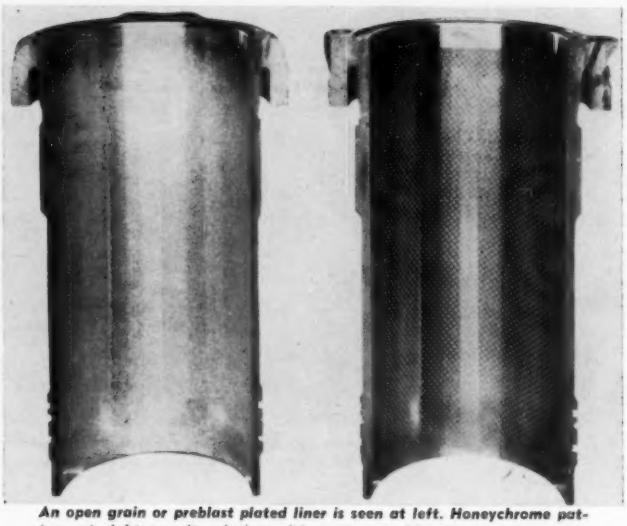
A lead anode is carefully centered in the liner. Spacing between the liner and anode must be accurately maintained to obtain uniform plate distribution. As little as 0.010-in. out of center might result in a heavier plate on the close dimension, and a liner which is out of round. The heavier the plate the more this out-of-round condition is exaggerated.

The chromium plating solution consists of chromium acid in water plus a small amount of another acid (usually sulphuric) in a 100 to 1 ratio. This solution generally contains 250 gm per litre (about 2 lb per gallon), or 400 gm per litre (about 4½ lb per gallon) of chromium acid.

Temperature should be within a few degrees of the plating range which in most plants is from 115°F to 130°F depending on the power equipment and voltage available.



One liner is seen being set up in a special machine for blasting by centrifugal action of a selected grade of carborundum grit before plating.



An open grain or preblast plated liner is seen at left. Honeychrome pattern at right permits plating with a more or less degree of porosity.

All plating requires 4 to 15-v, dc regulated by MG sets or rectifiers. Deposition rate depends on solution composition, temperature, current density, anode to cathode spacing, etc. Varying any of these will change the rate of deposition.

A good plating speed is about 0.0015-in. per side (0.003-in. on diameter) per hour when using a chrome solution of about 2 lb per gal at 130°F, about a 1-in. anode-cathode spacing, and 3 amps per sq in. An Alco 9-in. or an EMD 8½-in. liner requires about 2500 amps. An Alco 12½-in. or a Baldwin 12¾-in. liner takes about 4000 amps.

A liner requiring 0.060-in. on the diameter takes 20 hours actual plating time. It is impractical to put on this thickness in one plating operation and keep it round and true. It is usually done in three or more stages, while honing, inspecting and measuring between each stage.

After open grain plating, liner bore is polished lightly, inspected and measured prior to going to hone for final finishing. Final inspection consists of using a dial gauge with diamond points for measuring liner bore on both the A and C axis at intervals the full length of bore, along with fax films and other means of determining porosity range.

Honeychrome Finish

Preparatory operations for a honeychrome finish are the same as for open grain except that blasting is done with a much finer grit. This is solely for preparing liner bore for plating and not for porosity pattern. Every other operation including the plating and finish honing is exactly the same as for open grain plating.

After liner is finished honed to size, honeychrome pattern is put in. This is done by racking liner and deplating the desired pattern through a perforated mask in a suitable electrolite such as chromic acid. The mask, made of plastic, steel or other suitable perforated material, must be a friction fit in the bore.

Deplating requires about the same current density as for plating. Time will vary with thickness of chromium and depth of the etch. Generally it takes from 3 to 10 minutes. Depth of etch should be from 50% to 75% the thickness of chromium on liner, with etch or pit not extending through to the parent iron.

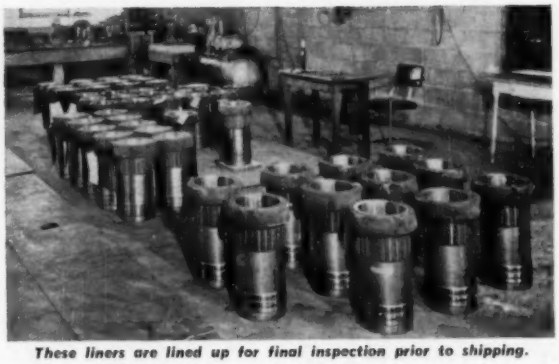
With honeychrome it is possible to produce a liner with more porosity at points of greatest heat and wear, and vice versa. When using the same masks, every liner will have exactly the same number and size of surface openings. However, depth may vary slightly from hole to hole and from liner to liner.

To minimize maintenance costs, the plating thickness on liner diameter should be as much or slightly more than the condemning limit for wear established. This prevents porosity from being entirely removed before reaching wear limit. Lubrication qualities are thus maintained throughout liner life.

Wear Comparison

Accelerated wear tests show that under the same conditions of maintenance, cast iron wear is 4 to 5 times faster than on oil retentive chromium.

Data collected by the Chromium Corp. of America from railroads and from liners received from railroads for salvage, indicates an even greater spread in wear of these two surfaces. Here are some results: wear on 500 EMD unplated liners from eight railroads showed an



These liners are lined up for final inspection prior to shipping.

average of 0.026-in. on the diameter; wear on 500 chromium plated Alco liners from five railroads, averaged 0.0045-in. on the diameter.

A further breakdown of wear found in these 500 Alco liners is interesting—32 showed no appreciable wear; 229 showed 0.003-in. to 0.004-in.; 116 showed 0.004-in. to 0.005-in.; 36 showed 0.007-in. to .008-in.; and 41 were cut through the chromium. As to the time these liners were in service, it is assumed that the usual cylinder assembly changeout periods were followed—24 to 30 months for EMD and 18 to 24 months for Alco. This average wear for these liners checked closely with wear found in the same type liners by two railroads for the usual changeout periods mentioned.

Assuming that these previously plated Alco liners had 0.010-in. to 0.012-in. chrome on the diameter when new, they would not have stood another tour of duty. The chromium would have been cut through before reaching the manufacturer's condemning limit for replating. However many of these liners were previously salvaged ones and had a much greater thickness than 0.010-in. of chromium on the diameter. They would have stood more service and still have fallen within the cylinder assembly changeout periods before reaching condemning limits.

Many liners could be returned to service instead of replating them if two conditions can be met: (1) heavier original chromium plating; and (2) a quick and accurate method of determining chromium thickness remaining on liners. This latter could be done by gauging chromium thickness above top ring travel and at point of heaviest wear. This would result in out of service time improvement, and a reduction in maintenance costs.

Two thickness-determining gauges are available. One is a small 110-v a-c meter which registers plating thickness within 10% and costs about $250.00. It can be calibrated from instructions with a set of thickness specimens which comes with each instrument.

The other is a small pencil-type pocket direct-reading gauge, also accurate within 10%. It costs about $45.00. But this gauge is more for supervisor use than for production shop work. Further information about these gauges can be obtained by mailing the service card in this magazine.

Winterized Locomotive Is Match For Yukon Weather

ADDITION of three GE diesel electric locomotives has made the White Pass and Yukon railroad 85% dieselized.

According to J. C. Hoyt, superintendent of the WP & Y Rail Division, two similar GE units already in service have cut fuel costs 60%; are easier to maintain; and are easier on the roadbed than the steam units now in service.

The 82-ton, 36-in. gauge, 3-axle truck, locomotives are powered by an 800-hp diesel. Each unit will pull trains averaging about 260 tons through mountainous territory, as compared to about 160 tons for the steamers now in service. The average grade for the first 20 miles from Skagway to the White Pass summit is 2.6%. The WP & Y track is 111 miles long, its northern terminus being Whitehorse in the Yukon Territory.

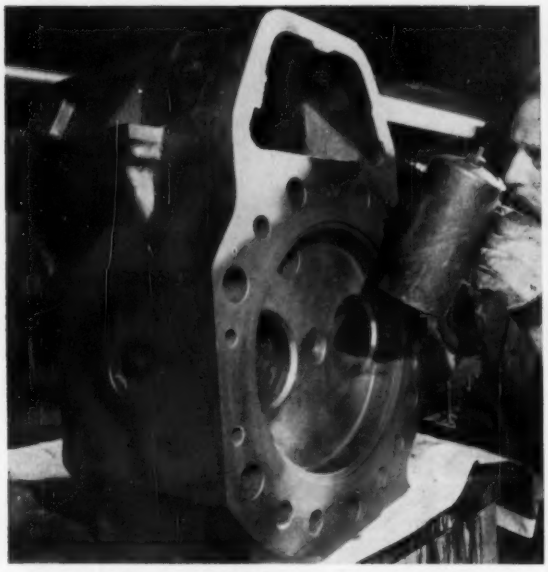
Although the railroad has a heavy excursion-trip volume, its importance is primarily in freight hauling. It is the prime carrier of base metals out of the region, as well as military construction materials.

The new locomotives are specially designed for the WP & Y which must operate in some of the fiercest winter weather. They include items designed to keep them operating in extreme temperatures from 95°F in summer to 65°F below zero in winter.

One feature is a device for heating the cooling radiator on downgrade hauls. When the locomotives are going down steep (as much as 3.9%) grades and dynamic braking is used, special air ducts conduct the resulting hot air to the engine's cooling water radiator.

Box-type cabs are used for better heating of the locomotives' operating parts and for crew comfort. This type of streamlined cab contains a large volume of air. This permits better heating by radiation from engine and accessories, and enables the fireman to reach all power plant and control apparatus without having to go outside.

Winterization includes insulating all outside piping and applying additional operating cab insulation. It also includes preheating of fuel; re-circulating of radiator air; additional heating of engine cooling water during idling periods; and extra protection of storage batteries by heating the battery box air.



A rebuilt Enterprise diesel cylinder head is being sprayed with 'dag' 154 to protect it against rust and foreign matter. The tough, thin colloidal graphite film also acts as an assembly lubricant.

Protective Coating Needs No Removal

Spray-on colloidal graphite coating protects bright metal parts. Application is fast and simple. Removal before assembly is not necessary.

PROTECTION of disassembled diesel engine components against moisture, dust and other foreign matter is a necessity. Everyone knows the results if you don't protect these parts. But, although there are various ways of protecting them, most are expensive and/or take too long to apply according to Philip Juvelis, plant superintendent of United Welding Processes, Inc.

Philip Juvelis is an authority on the subject. Each year his outfit rebuilds more than 5000 diesel engine blocks and cylinder heads from such leading makes as Caterpillar, I-H, Buda, GM and Waukesha. And each one must get a protective coating. The material they use is a colloidal graphite 'dag' 154, a new product developed by Acheson Colloids Co.

United Welding Processes, Inc. has found many advantages in the use of this new product. Coating of these parts with 'dag' 154, has eliminated the need for wrapping in wax paper after coating. The colloidal graphite dispersion dries almost immediately and does not, like oil or heavy grease, collect destructive foreign matter.

It has also reduced the time required for application of a protective coating by more than 600%. It takes only 45 seconds to spray 'dag' 154 on an Enterprise head covering a single 12½-in. diameter cylinder, weighing 600 pounds. According to Juvelis, the old method of brushing on heavy grease or oil required at least five minutes. And it did not give the unit complete protection because all the small intricate parts could not be reached by manual application.

Repairs made by United Welding Processes, Inc., covers practically any kind of damage to a block or head. This includes cracks in valve seats, water jacket freeze cracks, damage to cylinder walls by thrown rods, broken valves and stems, etc.

Repair work on blocks or heads begins with cleaning and degreasing. The units are placed in a 45-cu ft Heetmaster tank and washed with a solution of Turco Ferro-Clean heated to 210° to 220°F. This liquid is kept in circulation during a 4-hr degreasing period. When taken from the tank, the units are further cleaned by wire brushing and hot water at 140 psi.

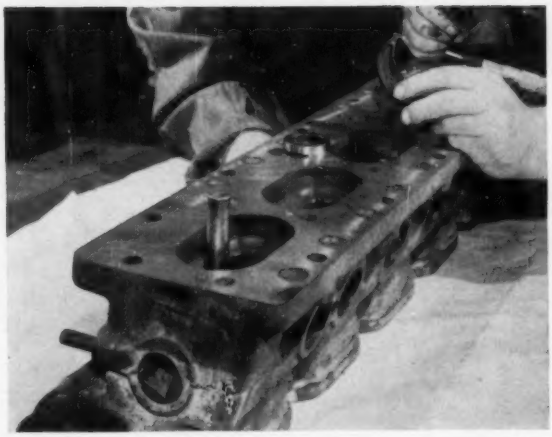
Clean units are placed on a #560 Van Norman surface grinder where the block face or head is ground. Only the surface is treated at this point, local areas are ground separately during subsequent operations.

The clean ground unit is then tested to discover the nature and extent of damage if any. This is done by sealing all openings with a plate which duplicates the part normally attached to the unit when assembled. The block or head is then filled with water at 100 psi. Leaks show the exact location of the break.

From this point the operation is divided into two sections: machining operations necessary for installing new seat rings, removing broken valve stems, etc., and the actual welding to repair the break.

Heavy-duty electric drills are used in conjunction with guides and jigs for machine work. This makes it possible to work on the break regardless of its location or severity.

After completion of the welding and post-welding work, such as inserting new valve seats in heads, units are inspected again. At this point, 'dag' 154 is sprayed on the units with a 1 qt. window-sprayer. United Welding mixes 'dag' 154 with nine parts of alcohol, fills the



A rebuilt diesel cylinder head is checked for smooth surface and close tolerances so that its components may be properly fitted. Later it will be coated with 'dag' 154 to protect these critical components from being scratched or scored with foreign matter.

sprayer container to the three-quarter mark, caps it and injects air pressure at about 100 psi. The air hose is then disconnected. By this method a large hand-sprayer will spray five or six units, depending on size.

To complete repair work on diesel engine components, Mr. Juvelis points out that you must cover them with a coating agent that will do three things: provide protection against moisture and rust and keep them clean; serve as a break-in lubricant when the unit is reassembled; and require minimum effort in the removal of the coating before assembly. 'Dag' 154, which leaves a tough, dry, lubricating film over both the surface and all parts, does the first two jobs very well, says Juvelis.

As to the third requirement, the new product has completely eliminated the necessity for removing the coating. It is just left on since unlike oil and grease coatings it does not pick up dust, sand and metal grindings. There is no danger of scratching or scoring the smooth surface, or of altering the tolerances of 0.001-in. that must be held in fitting other components.

United Welding Processes, Inc. has units taken on exchange, which have been repaired and held as stock for over a year. Even after that length of time, those units sprayed with 'dag' 154 appear to come right from the bench. Dust that has collected on them is blown off with an air hose and they are ready for immediate use. Before using this new protective coating it was not unusual to spend four hours or more to degrease these units.

According to Juvelis, the finished apearance of units sprayed with colloidal graphite is such that they seem to have been sand blasted. But of course this is out of the question. Control of the 0.001-in. tolerances would be lost. As a matter of fact, to avoid any misunderstanding, all company invoices are rubber-stamped with this statement: 'The black substance sprayed on this casting is a colloidal graphite for assembly and run-in of engines and need not be removed.'

Overall Performance of GM's Free Piston-Engine Improved

DEVELOPMENT work on GM's model GM 14 free piston-engine has increased its output 25%. And life of all critical parts now have over 90% availability factor at the end of a 4500-hr test run. Now rated 1250 gas hp, it has a 43½% thermal efficiency.

This unit was primarily designed for power station operation or ship propulsion. It is an experimental prototype of six gasifier units GM's Cleveland Diesel Engine Div. is supplying the U. S. Maritime Administration.

Basically the GM-14 operates like an air pump using the diesel compression ignition principal. A pair of compressor pistons bounce back and forth in a single cylinder pumping hot gases into a gas turbine from which shaft horsepower is obtained.

GM has successfully run one free piston engine on a range of fuels varying from 100 octane gasoline through the gasoline range, kerosene, diesel fuel, bunker "C" and crude oil.

In addition it has been run on vegetable and animal oils, such as whale oil, cottonseed or peanut oil. The only noticeable effect on engine output under these test conditions is that power output varies directly as the content of the fuel being used.

Early test work on several types of European models bared at least eight major problems during endurance runs. Practically all were overcome either by design changes or modifications of lubricants, such as the use of standard heavy-duty oils.

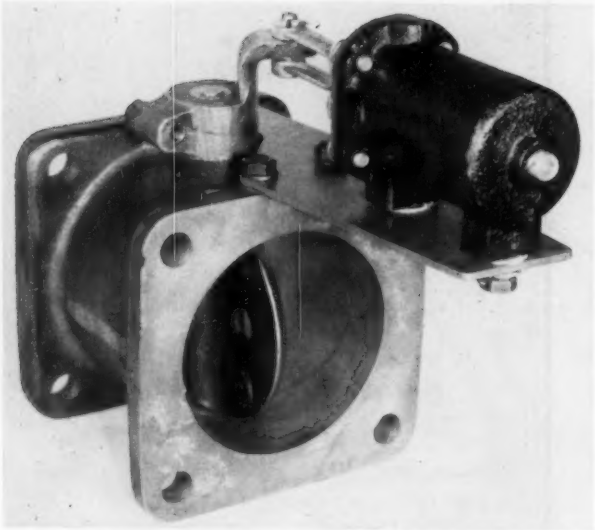
Excessive cylinder wear was remedied by revising surface finish specifications to comply with standard diesel practice. Wear, scuffing and breakage of piston rings was remedied by changing the facing and grooving rings.

Bronze wear-bands on the pistons were discarded and special steel-backed aluminum alloy bands were substituted and grooved like the piston rings. The bronze bands had been subject to sulphur attack.

Early valve troubles were eliminated by making up valves with aluminum segments instead of steel. Valve blades were made of a suitable spring stock correctly processed.

Other improvements were made in the design of pre-combustion chambers, injector seals, tubes, connecting links and all sliding seal surfaces, reducing oil leakages.

Also, design changes improved the engine's cooling and reduced valve deposits and valve leakage.



The butterfly valve, housed in an iron body, is held closed by a small air-operated piston in cylinder mounted on the housing. The valve, made of nichrome alloy, is held in open position by means of a spring.

Installing and Operating Mack's Exhaust Brake

Exhaust brakes are as good as their installation and how they are used.

EFFECTIVENESS of an exhaust brake depends on proper installation and understanding how it's used. Here are the details of how the one on Mack's B and H Series trucks with END-673 and ENDT-673 diesels works, is installed and should be used.

The complete assembly consists of a butterfly valve; 3-position manual selector switch; relay coil; magnet valve; oil or mechanical switch; air piston and cylinder; cut-off switch; and proper exhaust pipes.

The automatically operated butterfly valve is located in the exhaust system between the engine and muffler. It has only two positions—wide open and completely closed. It is actuated by an air-operated piston in a cylinder mounted on the exhaust brake housing.

When the valve is open, the exhaust system works normally. In the closed position, exhaust gas flow is restricted thus increasing engine retarding ability up to 50%. Exhaust gas is never completely cut off. There are two 19/32-in. escape holes in the butterfly. However, since fuel injection is cut off whenever the butterfly is closed, only air is actually being exhausted through these small holes.

Exhaust Brake Operation

The exhaust brake can be operated in three ways as determined by the dash-mounted manual selector switch. This switch has three positions; "off"; "normal"; and "coasting" or "automatic." In the "off" position the exhaust brake will not operate under any condition. In "normal", it only works when the service brakes are applied. In "coasting" position, it operates whenever the accelerator is released (fuel cut off) and the chassis pushes the engine.

Fig. 2 shows that battery current cannot get to the magnet valve except through the relay contacts. With the dash cut-off switch closed, one contact is always hot. These contacts only close when the relay coil is energized. However, it can only be energized when ground is connected to it through the oil or mechanical switch. Thus, the desired operation, "coasting" or "normal", can be set up in the manual selector switch but braking action occurs when the accelerator is released (coasting) or the brakes applied (normal).

In the "off" position, there is no electrical path to the relay coil. When "coasting" position is selected, the "coasting" and "off" terminals in the switch are connected, providing an electrical circuit to both the relay coil and the contacts. "Off" and "normal" terminals are connected in the "normal" position. The circuit to the contacts is fixed and when the stop-light switch is closed by brake action (oil or mechanical switch also) the relay coil circuit is completed, energizing it.

In either case, when the relay coil is energized it closes the relay points completing the circuit from the battery to the magnet valve. The magnet valve will then open and allow compressed air from the truck air-reservoir into the air cylinder. This moves the air piston and makes it close the butterfly valve (to which it is connected) putting the exhaust brake into operation.

Installing the Exhaust Brake Assembly

Place the exhaust brake assembly with the proper exhaust pipes in the location of the former exhaust pipe. On some models, the muffler may have to be moved back. For example, the muffler is moved back 9-in. on B-75 and B-753 factory installations.

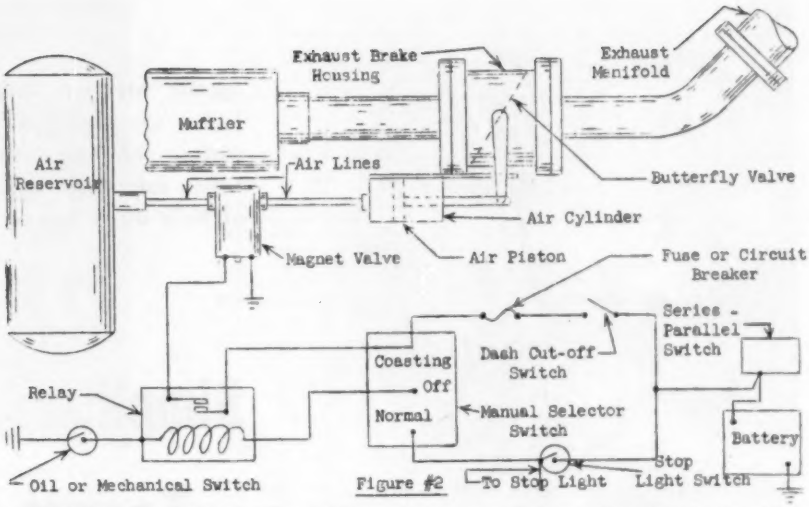


Figure #2

With dash cut-off switch in open position as shown, no current can flow through the circuit regardless of manual selector switch setting. With dash cut-off switch closed and selector switch in "normal", current flows through stop light switch and oil or mechanical switch to ground thus energizing the relay points when the accelerator is released and service brakes applied. With selector switch in "coasting", current energizes relay points when accelerator is released.

Screw the manual selector switch and its name plate on to the dash board.

Use the standard dash cut-off switch already installed, as the cut-off switch mentioned above.

Mount the relay on the steering column bracket on B Series trucks, and in the dash on the H Series.

In B Series trucks, screw the magnet valve on to the right hand front cab mounting-bracket (engine side). In the H Series screw it on to the rear cab support.

The oil switch, used only with hydraulic governors, can be mounted in two ways on B Series trucks. When no Tractor Protection Kit is used, clamp the oil switch and low air pressure indicator separately above the right hand front cab mounting-bracket (engine side). With a Tractor Protection Kit, mount them together at the same location as the oil switch when it's mounted separately.

Connect the capillary tube from oil switch to the governor plug.

Clamp the mechanical switch, (used only with mechanical governors), on to the head of the air compressor. Connect tie wire from the switch to a clamp on the accelerator. Adjust this clamp so that the switch is closed when the accelerator is in the off-position.

Place an additional fuse into the existing fuse block on B series trucks. Install another circuit breaker on the H Series.

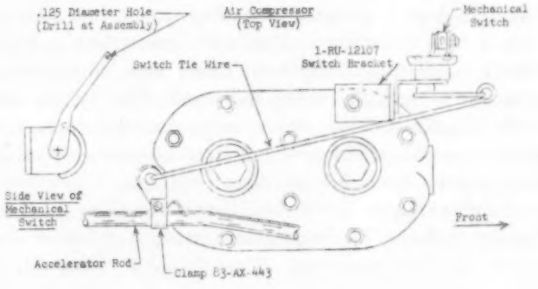
Manipulation by Truck Drivers

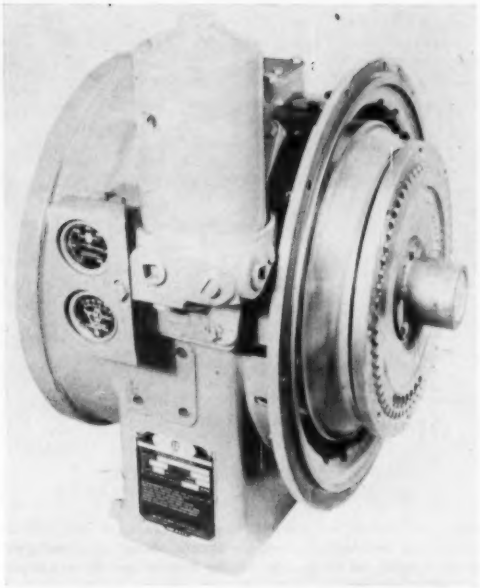
Knowing how the device functions and installing it correctly are not sufficient to get the full benefits available from the use of the exhaust brake. In addition the truck driver must manipulate it properly. Actually, all the driver has to do is flip the switch on the instrument panel to put the device into operation or cut it out—but he must know when to do this.

In starting up the engine, the switch should be moved to its center position, cutting out the exhaust brake. During normal driving, the driver should move the switch up to the "normal" position. This makes exhaust brake go into action whenever the service brakes are applied.

When descending long grades, the driver should flip the switch to the bottom position labeled "coasting" or "automatic." This makes the exhaust brake work whenever he lifts his foot off the accelerator, regardless of the service brakes. In this position, the service brakes are used as auxiliaries and applied and released as required. Since in this phase the exhaust brake will also retard drifting, it is not desirable for operation on level road. It would make downward gear-shifting more difficult.

When accelerator is released, oil or mechanical switch should be closed so current can flow to ground to complete circuit and energize relay points. Adjust position of clamp around accelerator so that the switch is closed with accelerator in "off" position.





The right side of the Twin Disc 1300 Series torque converter is seen here when facing engine flywheel. Capacity of these converters is from 30 to 212 hp.

Special blading design featuring "unloading" at higher speeds eliminates the need for free-wheeling stator. Interchangeable impeller blading permits rating selections. This new series extends the range of Twin-Disc's line of .....

Simplified Single-Stage Torque Converters

A NEW 1300 Series single-stage torque converter designed for high-speed diesel and gasoline engines has just been announced by the Twin Disc Clutch Co. This follows closely the introduction of their 1500 Series single-stage unit.

Applications for the new torque converter include shovels; front-end loaders; industrial hoisting machinery; road rollers; graders and many others where single-stage torque converter characteristics may be advantageous.

The minimum and maximum input range of the 1300 Series is 30 hp at 1450 rpm and 212 hp at 3200 rpm. Figure 3 shows the input horsepower and speed throughout the Series' entire range.

Specific torque ratings are 165, 200, 240, 285 and 330 lb ft, depending on the impeller blading selected.

Production of the 1300 Series currently consists of the Model "F". This is a spacer-type arrangement with a SAE No. 2 flywheel housing size and a SAE No. 2 or 3 output housing.

The 1300 Series unit features "unloading" of the engine through an exclusive blade design wherein the turbine develops a counter-head which stops fluid circulation at high speed ratios. This is a characteristic of Twin Disc's single-stage line, and differs from other torque converters currently being marketed. This feature not only simplifies construction by eliminating commonly used free-wheeled stators but also eliminates possible field failures from the use of such devices.

Another important design feature is that impellers having different bladings (both number of blades and pitch) are interchangeable. Thus the 1300 Series torque converters can be matched as accurately as possible to engines of various horsepower outputs and speeds (within rated limits) without requiring changes in the converter housing or other components. This considerably reduces the number of parts required for manufacturing as well as for replacement if the converter should be damaged in the field.

Figure 2 shows how the new converter's fluid circuit, exclusive with Twin Disc's single-stage units, differs from those of other manufacturers' designs. It is somewhat pear-shaped rather than round or elliptical. This type circuit permits the converter fluid to leave the impeller blades at constant diameters.

The fluid-charging pump is gear-driven from the impeller housing and turns at converter input speed. It has a capacity of 4.4 gpm at 2000 rpm. Basic pressure on the unit's circuit is maintained at 40 psi by a pressure regulating valve.

The fluid filter is of the micronic-paper type and is contained within a housing mounted to the main housing by means of an adapter plate. Fluid is filtered from the outside toward the center of the element. The filter is easily accessible for element replacement.

Fluid capacity of the converter circuit and pump, but less heat exchanger and external lines, is three gallons. The torque fluid recommended is API Class Ms grade of SAE 10W motor oil.

Heat exchanger cooling of the converter fluid is strongly recommended by Twin Disc. The reason is that the viscosity of SAE 10W oil varies considerably with temperature changes. This in turn varies the converter's efficiency. A high, uniform fluid temperature of from

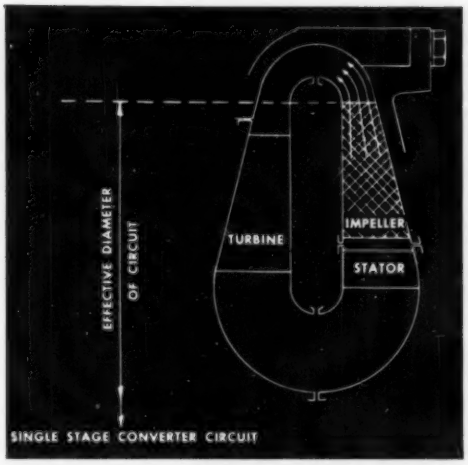


Fig. 2 shows the fluid circuit through the 1300 series converters. The pear-shaped circuit permits fluid to leave blades at constant diameters.

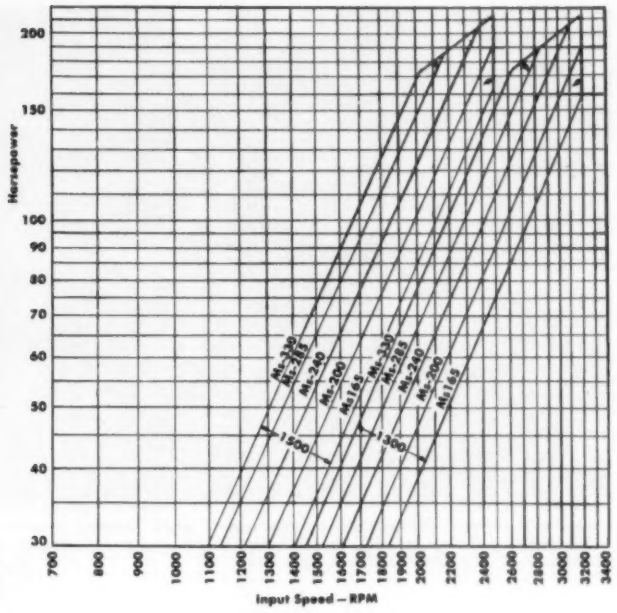


Fig. 3 shows curves from which can be determined the horsepower and the rpm capacity of the 1300 and 1500 Series single-stage torque converters.

180°F to 220°F is desirable. This can be obtained with a heat exchanger by use of the thermostats in the engine cooling system. Maximum permissible temperature for continuous operation is 250°F.

Cooling capacity for the fluid circuit should be sufficient to dissipate 30% of engine governed horsepower.

A unique feature of the cooling arrangement is that the unit has a provision for air-cooling a portion of the fluid. About ½ hp per 100 rpm can be cooled by air, thus permitting the use of a smaller, less-expensive heat exchanger in some installations.

The impeller and turbine of the 1300 Series torque converter are precision aluminum castings. The impeller cover is nodular cast iron and the reactor member is a fabricated assembly of steel profiled-section blades and stamped steel shells. Stationary housings are of conventional grey iron.

To make the physical size of this unit as compact as possible, gear teeth are cut directly into the unit's rotating impeller housing on the front end. In this way the impeller is connected directly to the engine flywheel through a driving ring.

An extension on the rotating impeller housing pilots into the engine flywheel. The opposite side of the impeller housing is supported by a bronze, steel-backed bearing mounted upon a carrier. This carrier is bolted to main housing to which are anchored stator blades.

The output shaft is also supported by two bearings. The front end is supported by a double-row ball bearing located in the bore of the flywheel pilot and the rear end by a single-row ball bearing supported in the converter housing.

The output shaft flange is bored to take a No. 206 pilot bearing, which is standard on the Twin Disc SP-111 friction power take-off. The SP-111 PTO has sufficient bearing capacity to permit full side loads. It also has a bolt circle and pilot diameter to mate with standard drive spiders.

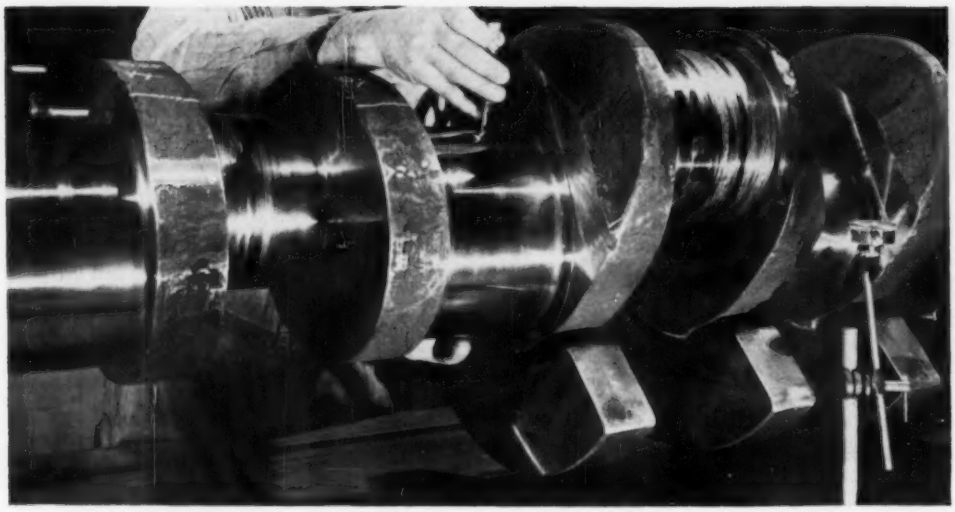
Standard SAE low mounting pads are provided with the 1300 Series unit. Rugged construction permits the rear end of the engine to be supported through the converter housing.

Two types of output shaft governor drives are standard. One is for the commonly used flexible cable drive and the other for direct mounting of either hydraulic or mechanical governors to the converter housing. Linkage is, of course, provided by the customer or original equipment manufacturer.

No lubrication is required for the 1300 Series torque converter. However, lubrication may be necessary for power take-offs or other types of equipment mated to the unit.

Introduction of the 1300 Series single-stage torque converter is another stride forward in Twin Disc's long-established history of specializing in both fluid and friction drives for industrial applications.

Combined with the Twin Disc 1500 Series models, the 1300 Series units bring to industrial equipment manufacturers and users a line of single-stage torque converters with a continuous range from 30 hp at 1100 rpm to 212 hp at 3200 rpm. The range is further broadened by Twin Disc's line of three-stage torque converters which have capacities running from 40 hp through 1000 hp.



This scored crankshaft set up on vee-blocks is being checked with a micrometer for diameters and with a dial indicator for runout. This is done after cleaning and magnaglo to see if it is within rework specifications.

Alco's Crankshaft Chroming Process

Details of the equipment and techniques used by Alco in their crankshaft reclamation process.

A DIESEL engine crankshaft is one of the most trying objects to chromium plate due to its design and shape. Even the most experienced platers are continuously kept on their toes observing many exacting precautions. And these precautions extend to the preparatory and finish steps as well as the plating operation.

For example, if a crankshaft isn't preground correctly, a subsequent good chromium plate will probably fail. Fillets are a most critical area and must be expertly handled in the pregrind as well as in the finish grind. Careful magnafluxing and demagnetizing are important. Precise anode design is essential since it changes for each crankshaft size and make. Special equipment and techniques are used for cleaning and preparing the crankshaft surface to insure the best possible bond.

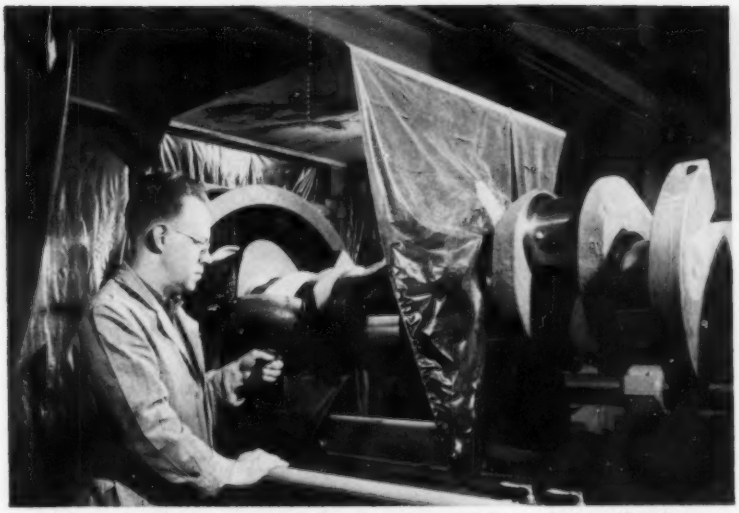
Finish grinding of the chromium is also important. In addition to selecting the correct wheels, using enough of the proper coolant and taking ample time for the job, the operator must be experienced. Yet, although all these preliminary and finish-up jobs contribute to its success, the actual plating with chromium is the major accomplishment of the whole process.

Although the machinery and most of the basic techniques of top-notch platers are quite similar for doing the supporting jobs, the actual plating process and one or two steps in the procedure always vary.

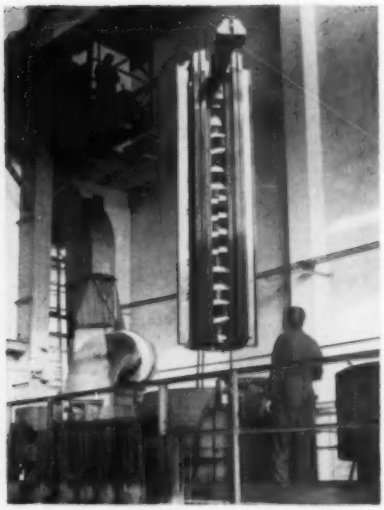
For example, the most common way to chromium plate a crankshaft is by rotating it while in a horizontal position. Yet at Alco's crankshaft-reconditioning plant at Auburn, N. Y., they've plated them for years in a static vertical position—and with excellent results. Proof is in the fact that they guarantee each shaft for 100,000 miles after chroming.

Alco engineers claim several advantages for vertical plating in addition to the obvious saving in space when vertical tanks are used. Crankshafts over 13-ft long are easily accommodated. Attachment of anodes to crankshaft and installation of electrical connections to the anodes are simplified. Distortion that might result from horizontal suspension is avoided.

All these plus other factors were taken into consideration when Alco decided to up-date the soft crankshafts in some of their earlier engines by chrome plating to match the quality of the hardened crankshafts in their newer



After crankshaft is cleaned it is inspected with magnaglo for cracks and surface checks. Examination under ultra-violet light makes it easier to detect defects.



A chromium plated crankshaft with anodes attached is removed from a plating tank at the Alco shop ready for rinse and final finish.

models. Let's follow one of these old shafts through the shop and see how some of Alco's equipment and techniques differ from the more commonly used horizontal crankshaft plating

Preparing Crankshaft for Chroming

After recording its serial number the crankshaft is dipped in a hot alkaline bath and stripped for inspection. When clean, it is inspected with magnaglo for cracks and surface checks to determine if they are within rework specifications. Examination under ultra-violet light gives a more positive indication of cracks and other defects than mangnafluxing.

If the shaft is okay it is demagnitized, then placed on vee-blocks and the journals checked for runout with a dial indicator while the shaft is rotated very slowly. The crankshaft is next checked for straightness. On runouts up to 0.046-in., Alco straightens the shaft by the peening method. Next each bearing surface is checked with a micrometer for diameters.

The crankshaft is next set up on either of two Van Norman grinders for pins or on two Cincinnati grinders for mains. All main and pin bearing surfaces are ground straight and round and with proper geometric relationship. This is important since wear is generally on one side of the pin. Centering on the least diameter and grinding it round would throw off the stroke or the angular relationship of the pins. The pins are properly trued up and indexed during pregrind to insure an equal thickness of chrome at finish grind.

At this time the fillets are also reworked if necessary. Generally all that is done is to blend in the radius with the journal surfaces that were undercut. Since these grinding operations may have opened up some tiny cracks the shaft is again inspected with magnaglo. Then it is cleaned with a solvent and grit blasted with aluminum oxide. This is done to insure that grinding dust, etc., is completely removed. The shaft must be absolutely clean, dry, and oil-free before plating.

Vertical Crankshaft Chroming

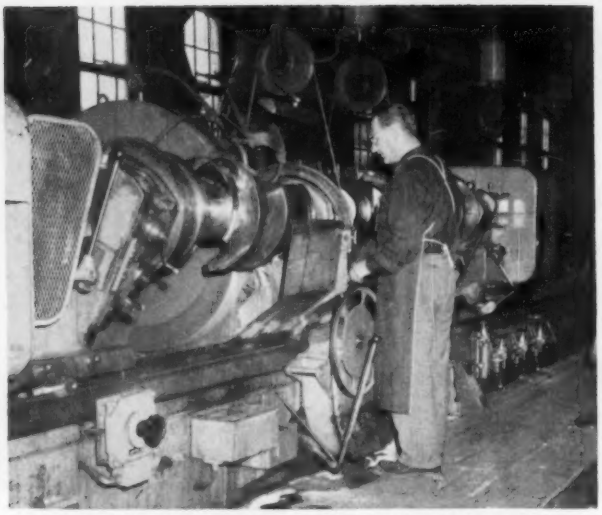
The shaft is then set up for plating. Anodes mounted in a fixture surround each journal on the crankshaft. The fixture is attached securely to the shaft. These anodes are connected to the cables supplying plating current from a rotory converter. The crankshaft, complete with its fixture is then lowered into the plating tank and the current turned on.

The average rate of depositing chromium on the radius of the crankshaft is 0.001 in. per hour. Nominal plating is 0.010 in. on the radius or 0.020 in. on the diameter of the average worn shaft. By sizing the bearing surfaces correctly when pregrinding, the proper thickness of chrome will be left on when the shaft is finished.

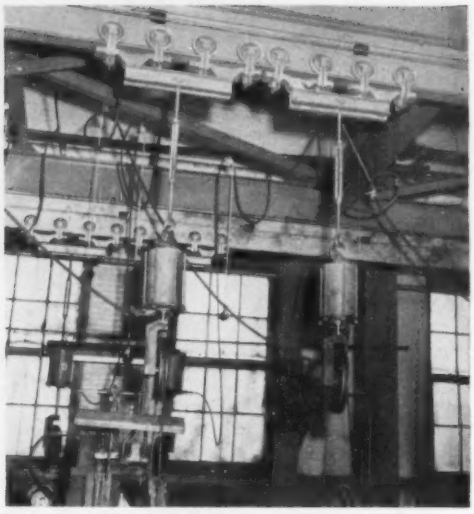
Actually, an excess amount of chrome is put on the shaft when plating to allow for that removed during the finish grinding. But according to Alco, the maximum chrome plating found to give satisfactory and desired results is 0.0625 in. on the diameter of scored pins or journals. If possible, the crankshafts are always brought back to the original diameter. Otherwise, they are finished to a standard undersize.

The question of heat treatment after plating was thoroughly investigated by Alco Products Inc. to determine the effects of possible hydrogen embrittlement on the crankshaft.

Alco's thoroughly evaluated tests indicate that strengths of their as-plated shafts are consistantly about equal to specimens plated under the same conditions and baked out at 800°F. Fatigue strength without baking was ade-



Crankshaft on this Van Norman grinder is getting final pin grinding and lapping to 10-micro inch finish or less. Grinding tolerances permitted are plus zero to minus 0.002 in. on the diameter.



These pneumatic overhead compensators which take any sag out of long crankshafts while on the Van Norman grinder permit grinding from plus zero to minus 0.001 in.

quate to meet Alco's most exacting service requirement. Therefore, they concluded heat treatment *with their process* was unnecessary.

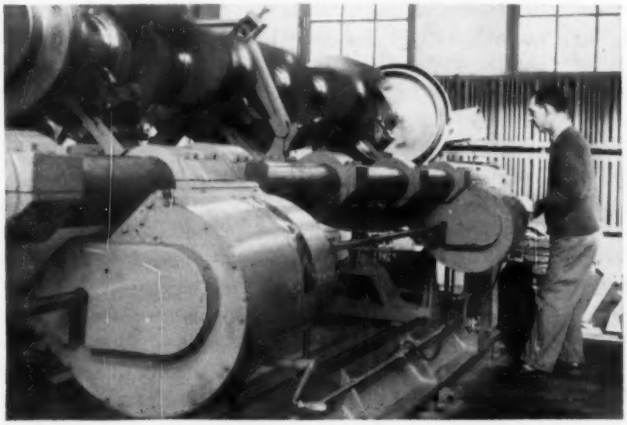
Finishing includes final grinding and lapping of the bearing surfaces to a 10-micro finish or less. Grinding tolerances permitted are plus zero to minus 0.002 in. on the diameter, but generally plus zero to minus 0.001 in. are obtained. Attainment of these close tolerances is aided considerably by use of pneumatic overhead compensators on the Van Norman grinders. These take any sag out of long crankshafts and permit very accurate straight grinding.

After all bearing surfaces are ground, oil holes are faired. Bearing surfaces are then polished, runout checked again, oil passages are cleaned, and any necessary plugs installed.

The final operation is the crankshaft balance check. This is particularly necessary when shafts are being reworked by drilling the center main journal and two adjacent crank pins to accommodate Alco's new grooveless center main bearings. (See Diesel Power, March 1956) Alco's final unbalance tolerance is 30 in.-oz.

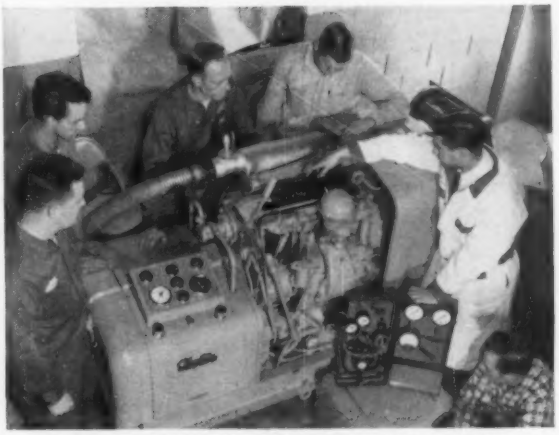
They have found in almost every case that drilling for the grooveless center main bearings has disturbed the balance of shafts that previously had acceptable inch-ounce tolerances. This variation, sometimes as high as 90 in.-oz, is corrected by drilling the counterweights. Alco's experience in reconditioning crankshafts emphasizes the absolute need for dynamic balance recheck following any machining of the crankshaft.

After final cleaning, inspection and magnaglo check, the crankshaft is dipped in a rust preservative. The shaft, now up to new crankshaft specifications, is ready to leave the shop.



This crankshaft is receiving final balance check on balancing machine. If it is found to be off balance it is drilled to remove metal at different points on the counterweights.

This is a typical mobile school classroom as set up by GM. Over 15 tons of training equipment, including live engines, cutaway models, sub-assemblies, tools and visual training aids are required for the complete course.



This special dynamometer connected to a live test engine is newest training aid added to Detroit Diesel's mobile training units. Here students are troubleshooting with a diagnosis kit to determine what is wrong with engine.

Mobile School's Effectiveness Increased

Scope of Detroit Diesel's on-the-job service training has been increased by new tooling and techniques.

DYNAMOMETERS and special test engines are increasing the effectiveness of Detroit Diesel's mobile training units. These items have been added to facilities already being shifted around for on-the-job service training to GM diesel owners and operators.

The new training aid is a special Clayton dynamometer permanently connected to a live Detroit Diesel engine. The unit was designed by H. J. Vaughn, Detroit Diesel's service training director. Devices which enable instructors to simulate conditions that can cause equipment downtime or power loss in the field are installed on the engine.

In "lab" sessions the dynamometer is used to show the loss of horsepower caused by the use of these devices. Trainees also use a diagnosis kit to determine what is wrong with the engine. They then learn the proper procedures to prevent or correct the simulated conditions.

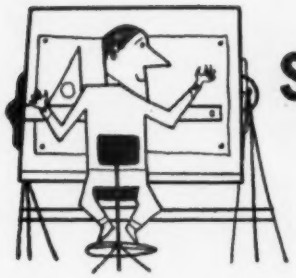
Back on the job this training helps operators and mechanics to identify these conditions should they occur. This makes them better qualified to keep construction equipment working at top efficiency with a minimum of downtime and maintenance cost.

Engine design and operation, tune up, trouble shooting, diagnosis and preventive maintenance are covered in the two-day courses. The courses are conducted by factory school instructors, and are unique because trainees learn by actually performing the servicing operation themselves. According to Vaughn, the entire program is geared to provide a better understanding of the 2-cycle GM diesel, its proper operation and servicing.

The new equipment, generally restricted to factory training schools, was introduced last month to over 100 trainees who attended a series of two-day sessions in Grand Rapids, Mich. The sessions marked the beginning of the ninth year in which Detroit Diesel has given this training. They were held in the shops of Peninsular Diesel, Inc., Detroit Diesel distributors.

During the last eight years, these on-the-job programs have been presented to over 35,000 trainees throughout the country. They have been set up in distributors' and users' shops and at major construction projects in all 48 states, Alaska, Canada, Mexico and South America.

More extensive service programs are held for GM engine owners and operators at the Division's factory training school in Detroit and at the GM Training Centers in Atlanta, Denver and San Leandro, California.



service section

Recent engine and equipment modifications, procedures and recommendations straight from the different manufacturers to you

Chrome-Plated Compression Ring for Cummins Engines

A chrome-plated steel top compression ring is now available for use in 5⅛-in. bore engines having cast-iron liners. Never use chrome-plated rings in a chrome-plated cylinder liner.

This steel ring design has two advantages:

1. It is more resistant to breakage than cast-iron rings with the result that this will reduce chances of piston burning and cylinder liner scoring.

2. It has a heavier-than-usual application of chrome plating which will increase ring life.

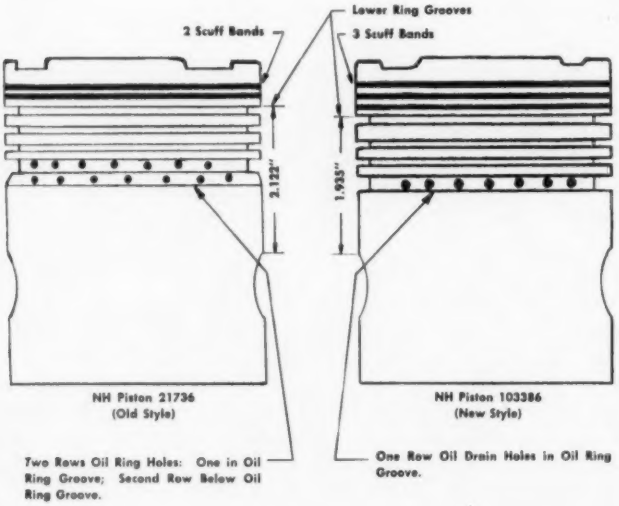
These rings can be identified by color, by lack of a counterbore, and by a 1/32-in. by 45-deg chamfer on the inner edge of the ring as shown in the sketch.

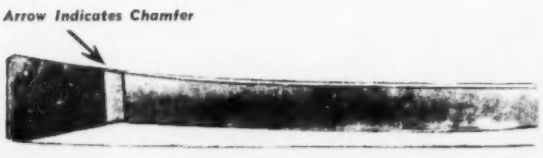
The combination of the redesigned piston with Ni-Resist insert, the new steel chrome-plated ring, and good maintenance of the intake air system will give much longer engine life in operations where piston and ring troubles have been prevalent.

Parts numbers of these chrome-plated rings in standard and oversizes are as follows:

Part No.	*Size*
104200	Std.
104202	+ 0.020″
104203	+ 0.030″
104204	+ 0.040″

Ring gap clearance as measured in a new liner must be from 0.017-in. to 0.027-in.


2 Scuff Bands
Lower Ring Grooves
3 Scuff Bands
2.122″
1.935″
NH Piston 21736
(Old Style)
NH Piston 103386
(New Style)
Two Rows Oil Ring Holes: One in Oil Ring Groove; Second Row Below Oil Ring Groove.
One Row Oil Drain Holes in Oil Ring Groove.

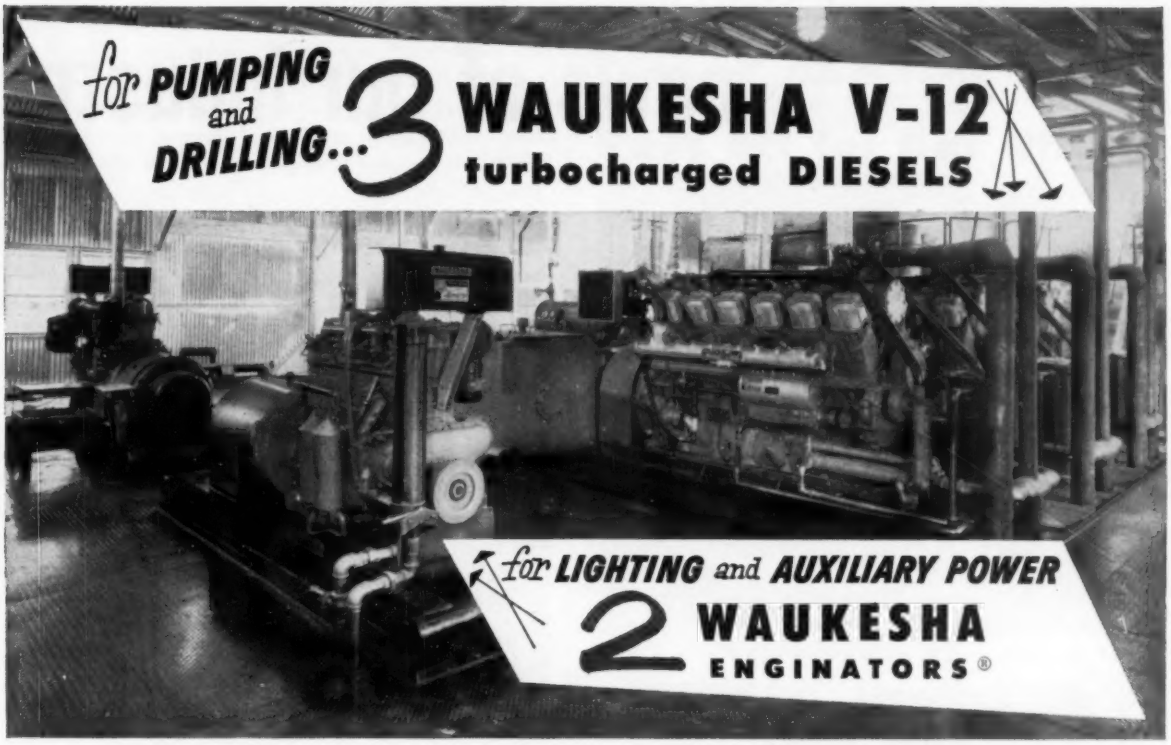


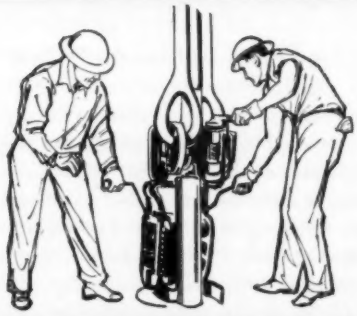
I-H Flexible Hose Assembly

A new flexible final filter to injection pump hose assembly 275 946 R91 is available for 14 series crawler tractors, replacing final filter to injection pump pipe, 63 049 DAX. This new fuel line will provide for increased life as it has greater resistance against vibration than the old rigid fuel line.

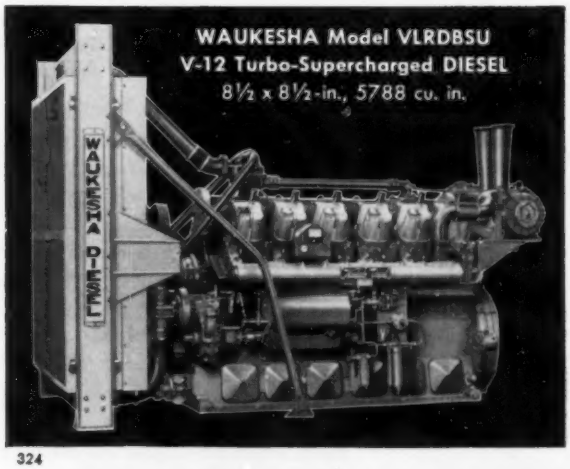
A bulletin will be released as soon as possible covering same type of change for the 18 series crawler tractors.

In order to accommodate a flexible hose on I-H single plunger fuel injection pumps it is necessary to change the fuel inlet fitting, complete. Therefore, in order to eliminate extra expense to the customer who is ordering the old steel pipe, old or new parts are to be furnished as ordered.





Brewster-Bartle Drilling Co. Inc. use WAUKESHAS on "Trinity Bay" inland barge on South Louisiana coast



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● Three VLRDBSU Waukeshas do the drilling and pumping here. They're big... and equipped with exhaust-driven dual turbo-chargers for extra power that's extra-smooth. Rugged for heavy duty, but compact... and yet simple in design for complete reliability with high fuel economy and low upkeep. They're 12-cylinder, 60-degree vee, four-cycle, 5788 cu. in. full Diesels with counterbalanced crankshafts. Send for Bulletin 1663.

For lighting and auxiliary power there are two Waukesha WAKDB 100 KW Enginators. These accurately balanced, conservatively rated Waukesha Diesel engine-driven generator combinations supply a smooth, steady flow of power for continuous duty. Other Waukesha Enginators in capacities from 600 to 50 KW. Send for Bulletins.

WAUKESHA

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN • NEW YORK • TULSA • LOS ANGELES

news of our industry

New Cab-In Front Locomotive Design

A new line of medium-duty switching locomotives of the "cab-in-front" design has been introduced by Plymouth Locomotive Works. This follows a trend of larger railroad diesels. The construction is a reversal of the industrial switcher built in the past.

This new design is offered in the 25- to 40- ton range, either 4 or 6-wheel drive, with a choice of diesels. The new streamlined cab gives the operator almost unobstructed vision in all directions. Air tanks and other equipment are now enclosed in cab, yet are accessible. The "Plymouth Torqomotive" gets its name from a condensation of "Hydraulic Torque-Converter Locomotive" and refers to the use of a hydraulic torque-converter coupled to a Plymouth transmission.

This method of transmitting power from the engine to the wheels is smooth and permits maximum power to be applied at any time without excessive slippage. The new design has proven popular with operators and owners alike. Located in Plymouth, Ohio, this company has representatives located in principle cities of the United States.

I-H Crawler-Type Front-End Loader Piles Minerals

This 77-hp, International-Harvester Model 12 Payloader was recently bought by Pennsalt Chemicals. The crawler-type, front-end loader is a versatile unit. It is used for a variety of jobs at the Pennsalt Natrona, Pa. plant.

This rear-engine mounted unit with a 1¾ cu yd bucket is used to load cryolite into Dempster buckets from stockpile at the site. Cryolite, a mineral found in abundance only in Greenland, is processed in a separate division of the plant.

The Natrona firm has the franchise in this country for this mineral whose chief use is as a solvent for alumina in the electrolytic bath used in the manufacture of aluminum.

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LMOA Out to Make '57 Best Ever

By boosting membership, Locomotive Maintenance Officers Association intend to spread results of their top technical programs over a broader base. With the high quality of data presented, it's hard to understand why every railroad mechanical man hasn't joined the ranks. Theirs is a "grass roots" approach to fact-finding with trial runs being tested now prior to the annual session coming up in September. Over 4000 active members find LMOA well worth their while—good for the individual and good for the railroads.

Top Year for Heavy-Duty Trucks

After a record 1956, Robert F. Black, board chairman of White Motor, looks for a banner '57. He expects heavy-duty truck producers will match last year's 600 million dollar volume, a 12% increase over 1955 and almost 100% above 1950.

Gulf Answer Man to Petro Problems

All petroleum product users can now look to Gulf for complete and cost-free advice from their 99 district and 8 division sales offices. This "Petro-engineering Service" described in a 24-page brochure, covers all phases of petroleum—applications, economical use, wear, maintenance, storage and dispensing. Any operating, maintenance or purchasing executive, any engineer or technician can call on the know-how of Gulf's 1300 scientists, engineers, metallurgists and chemists.

Kenworth Trucks to Whitfield

Six more Model 925 trucks with Fuller R96 10-speed Roadranger transmissions and powered by Cummins NHB 200 hp diesel engines are now operating on Whitfield's El Paso, Albuquerque and Salt Lake City runs. The custom built Kenworths have chrome manganese heat-treated steel frames, high-tensile steel wheels and 13,320 lb. chassis. Weight saving features include drop-frame front end design and torsion spring tandem axle drive.

Reading RR Working on Warm-ups

Now in the works at Reading Railway is an automatic device which starts and stops a diesel engine miles away from the locomotive it powers. When the thermometer drops, a cable system of thermal relays at the engine control board flags the far-away diesel to turn on. Thus, the gadget will obviate engine freeze-ups and warm-up delays.

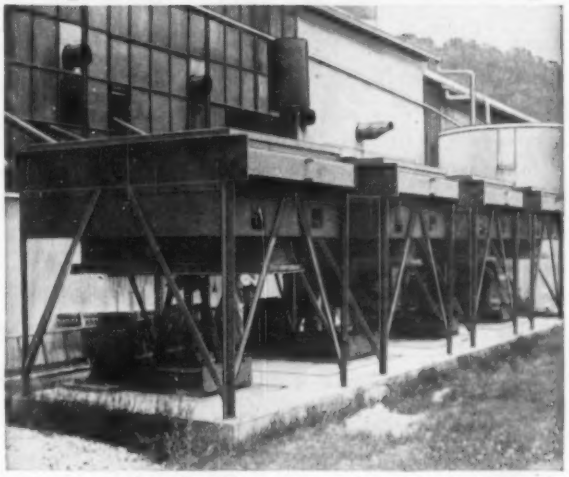
News, too, is the installation this month of an infra-red system on the N. Y. branch to detect and record any hot boxes as each freight car passes.

Two Dozen Macks Headed High

For hauling ore from mines 14,000 ft. above sea level, Bolivian Mining Corp. placed an order with Mack Trucks for 24 Model B-30P dump units equipped with 130 hp Thermodyne diesel engines having high compression cylinder heads.

Young Engineering Talent

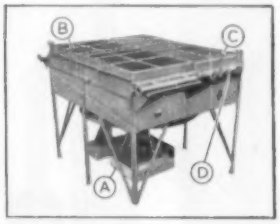
Pays off for Gas Utility*



*South Penn Natural Gas Co. Station, Smithfield, West Va.

Young "HC" Atmospheric Radiators

eliminate cooling water supply problems



The Problem: To replace an old cooling tower serving gas compressors. A nearby creek furnished the uncertain water supply.

How Young solved it

Young HC Horizontal Core Cooler and Condenser

Four Young Radiator Company HC Atmospheric Radiators were specified to cool four 165-hp compressor engines. Natural gas is compressed from local field lines and well-head to pressures suitable for shipping to distant sales points. Installation of the Young Units has modernized the compressor cooling system. In addition it has made the utility independent of the uncertain water supply.

A. Independent mounted fans eliminate unit vibration.
B. Coils designed for easy access to tube ends.
C. Coils supplied for any operating pressure.
D. Steel tanks treated for corrosion resistance.

Write Dept. 417-C for FREE Catalog

Put Young Talent to work for you . . .

Solving heat transfer problems is what we do best because it is our very reason for being. You, too, can harness the power of Young engineering talent. Write, wire or call without obligation.

HC is a registered trademark.

Young RADIATOR COMPANY

RACINE, WISCONSIN

Creative HEAT TRANSFER ENGINEERS FOR INDUSTRY

Heat Transfer Products for Automotive, Aviation and Industrial Applications. Heating, Cooling, Air Conditioning Products for Home and Industry.

Executive Office: Racine, Wisconsin, Plants at Racine, Wisconsin, Madison, Illinois

news of our industry

Alco Diesels Go To India

An order for 100, 2000-hp diesel electric locomotives has been placed with Alco Products, Inc. by the Indian Railways Ministry.

Alco, in collaboration with the Government of India, will enter into an agreement to train Indian personnel in the repair and maintenance of these engines.

Gardner-Denver Concludes Week Long Conference

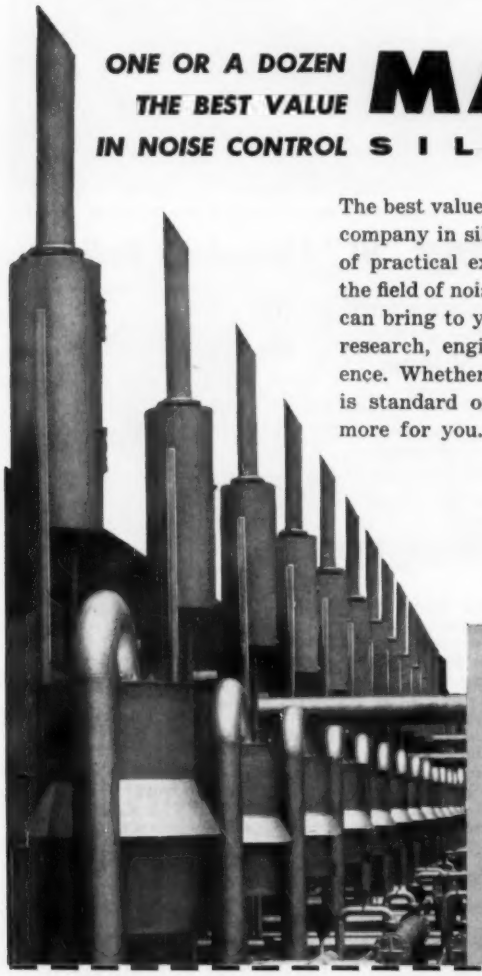
Representing a total of 1258 years' experience, special representatives, district managers and engineering personnel from Gardner's home office, recently concluded a week long conference in Quincy, Ill.

The conference was highlighted by a preview and description of advanced designs to become available on 1957 compressors, pumps and other G-D units.

ONE OR A DOZEN THE BEST VALUE IN NOISE CONTROL

MAXIM SILENCERS

The best value because Maxim, the pioneer company in silencing, can point to a store of practical experience second to none in the field of noise control . . . because Maxim can bring to your problems more years of research, engineering and design experience. Whether your silencing application is standard or "special", Maxim can do more for you.



SILENCERS FOR:

- INTERNAL COMBUSTION AND STEAM ENGINE EXHAUST AND INTAKE
- AIR COMPRESSOR INTAKES AND DISCHARGES
- VACUUM PUMP DISCHARGES
- BLOWER INTAKES AND DISCHARGES
- STEAM, AIR OR GAS DISCHARGES
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- WASTE HEAT RECOVERY

THE MAXIM SILENCER COMPANY
Subsidiary of Emhart Manufacturing Company
93 Homestead Ave., Hartford, Conn.
Gentlemen: Please send bulletins on silencers for:
.....
NAME.....
COMPANY.....
ADDRESS.....

Assn. of Diesel Specialists Holds Second Meeting

Based on numbers alone, the second meeting of the Association of Diesel Specialists was three times as good as the first one. At the preliminary meeting (Diesel Power, Jan., 1957) 13 shops specializing in sales and service of fuel injection equipment and governors were represented. The second meeting, held in Chicago, Feb. 16 and 17, attracted 26 more. Membership is now up to 39 firms.

There were several more representatives of manufacturers than at the first meeting. They contributed technical information, some assisted in the organizational work, and all were generally helpful to this young organization.

The two-day meeting was split between organizational work and the presentation of an informal technical program. No one went away empty-handed; they got either useful information, a job to do, or both.

Organizational work is progressing in the hands of appointed committees. Many current problems are expected to be solved and administrative details worked out for the approval of the general membership by the time of the next meeting. This meeting, incidentally, is tentatively set for St. Louis, Mo., in mid-June 1957. We'll keep you informed.

American Air Filters To Be Marketed in England

Air Control Installations Ltd. of Ruislip, Middlesex, are marketing, by arrangement with the American Air Filter Co., Amer-glas air filters under an exclusive sales arrangement for Great Britain.

Consisting of multiple cells of special filter medium with capacities ranging from 650-cu ft per min. to 1200-cu ft per min, these units are ready for installing in metal frames. The glass-fibre material, states the manufacturer, has a number of advantages. One feature being the special construction which ensures progressive density from front to back of the pad, enabling the filter to trap dust and dirt, reducing heavy dust deposits and resulting in maximum efficiency.

news of our industry

Mack Construction Vehicles Go To Canada

Harold Conner, vice president of Mack Trucks of Canada, Ltd. announces the sale of 50 large-capacity dumper and mixer trucks to Miron Freres, Ltd., of Montreal. Powered by 170-hp Mack Thermodyne diesel engines, these big 6-wheel vehicles feature the Mack 20-speed, "Quadruplex" transmission. The firm will use the construction vehicles in its contracting operations throughout Canada. This order brings the number of Mack diesels in operation by the company to 375.

Diesel-Generator Contract For BLH Hamilton Division

A contract of approximately $130,000 has been awarded the Hamilton Division (Hamilton, Ohio) of B-L-H Corp. by the Borough of Weatherly, Pa. It calls for a 1000-kw diesel engine generating unit. The order, for a complete installation includes diesel engine, generator, piping, foundation, wiring, switchgear and associated auxiliaries and will duplicate the unit installed at Weatherly's electric plant in 1951. The diesel, a Baldwin 608-sc, 8-cyl, 4-cycle, 1435 bhp at 600 rpm, will be connected to a Westinghouse 1000-kw a-c generator.

Pickled Locomotives

The Army Transportation Corps. has come up with a way to preserve valuable locomotive engines by putting them in aluminum mothballs. The process begins by placing the engine on a metal pan and completely covering it with sheets of osnaburg cloth. Coats of plastic and tar are sprayed over the cloth and are then followed with a coat of aluminum paint, used for its protective qualities in all types of weather. Ranging from 45-ton, 300-hp switching units to 131-ton, 1000-plus-hp road engines at a cost of $90,000 when new, the locomotives are moth-balled at an approximate cost of $2,200 each, thus keeping vital engines quickly available and saving taxpayers' dollars.

Consolidated Expands Operations

Consolidated Freightways, Inc., has purchased operating equipment and terminals in Alaska, of Garrison Fast Freight, Inc. This was announced jointly by J. M. Garrison, president of Garrison Fast Freight and J. L. S. Snead, Jr., president of Consolidated Freightways. The purchase price of close to $1,500,000 includes trucks, trailers, terminals in Anchorage and Fairbanks and other equipment. Garrison now supplements the highway operations conducted through Canada to Alaska by Northern Freightways, Inc., a division of Canadian Freightways, a subsidiary of C-F. Mr. Garrison has been appointed a vice president of Consolidated Freightways and will manage the operation as the Garrison Fast Freight Division of C-F.

(*Continued on Page* 65)

Here's Why

PERFORMANCE IS BETTER WITH Bendix STARTER DRIVES

CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

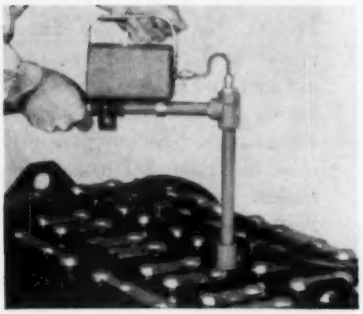
It takes a truly outstanding product to receive over 100,000,000 endorsements. Yet, that's the number of Bendix Drives that have been installed. No other starter drive approaches this record of outstanding performance. That is why, whatever your type of diesel or whatever its purpose, it will pay you to specify Bendix* Starter Drive for the most economical installation and dependable performance. *REG. U.S. PAT. OFF.

ECLIPSE MACHINE DIVISION of Bendix AVIATION CORPORATION

ELMIRA, NEW YORK

Export Sales: Bendix International Division, 205 E. 42nd St., New York 17, N.Y.

new products



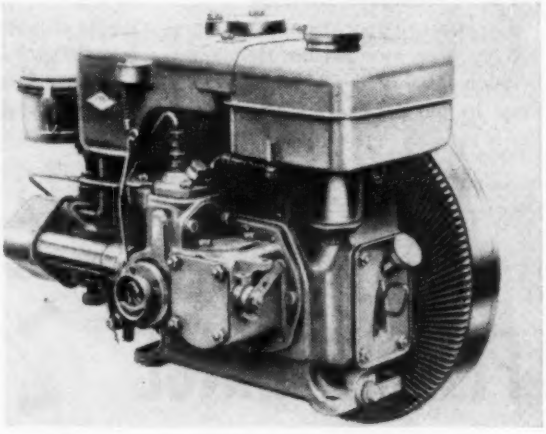
Cell Filler For Industrial Batteries

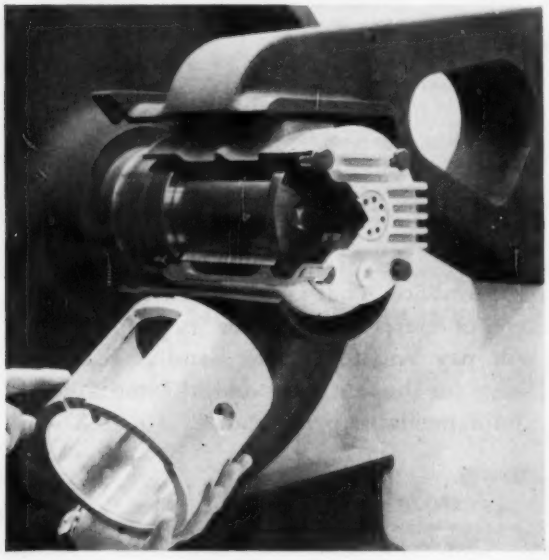
A battery cell filler that was developed for railway service is now being offered to industrial plants by Gould-National Batteries.

Called the "Rite-Hite" cell filler, it controls the electrolyte level in batteries by adding water to the correct height without overflushing. Connected to a water supply of 20- to 50-psi, the filler consists of a long tube to allow reaching across large batteries and a hydrostatic means of controlling the flow. According to the manufacturer, maintenance of the "Rite-Hite" is simple as it has few moving parts. As the nozzle of the filler is removable and threaded into a coupling on the tube, the filler can be adapted quickly to filling all types of batteries.

Lynn Imports Diesel Engine From Germany

Lynn Engineering is offering on the U. S. market, a 6-hp German diesel engine known as the Farymann type EK. The four-cycle engine is rated 6-hp at 2000-rpm continuous. Completely self-contained, the 187-lb unit is designed to power generators, pumps air compressors, tractors and marine equipment. The engine incorporates a flywheel condenser cooling system that requires no radiator, fan or water pump. Instead, a closed water tank is cast integrally with the main cylinder casting. Water vapor is forced through the flywheel where it is condensed by air blast over the flywheel and returned to the water tank by centrifugal force, thus reducing the amount of engine power required. Equipped with a German Bosch fuel pump, injector and fuel filter, the unit can run on stove oils or standard diesel fuels. Use of SKF ball and roller bearings, allows simple splash-type lubrication.





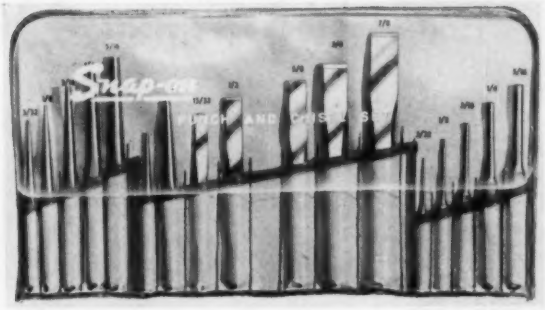
Hot Boxes On The Way Out

Development of a sealed axle bearing which promises to eliminate "hot boxes" on railroad car axles was announced by E. B. Newill, v-p of GM and general manager of the Allison Division.

Known as the Allison Kar-Go Bearing, the new unit consists of a hardened axle sleeve; an aluminum alloy bearing; and a felt wick lubricator oil assembly. All are contained in a housing that fits into the standard railroad car journal box, or in narrow or wide-jawed side frames.

Entrance of foreign material and loss of lube oil, the main causes of "hot boxes," is practically eliminated with Kar-Go bearings since all the parts contained within the unit are sealed. Overall dimensions of the bearings vary from 5 x 9-in. to 6½ x 12-in.

Mr. Newill said that the new Allison bearing has been successfully tested by 10 leading American and Canadian railroads. They have accumulated more than five million miles with the Kar-Go bearing. Eighteen more companies are ready to start their own test program by installing the new bearings on their own lines.

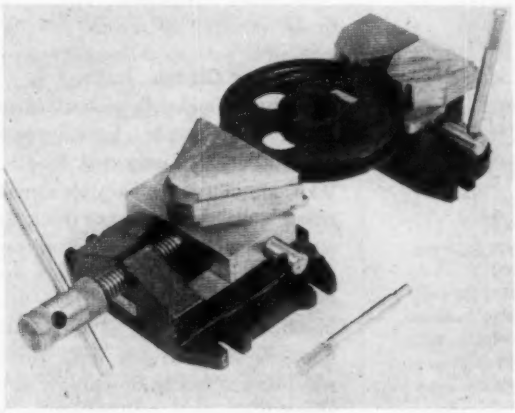


New Octo-Square Punches And Chisels

These newly designed punches and chisels just released by Snap-On are square shaped with beveled corners. This provides a more comfortable surface for firm control, greater safety and prevents tool from rolling out of reach.

A special alloy steel is used in these punches and chisels. It is heat-treated under controlled atmosphere for uniform hardness. Chisel and punch heads are then induction drawn under electronic control to reduce hardness to the proper degree for a controlled-mushrooming, long life striking surface. Chisel edges are ground to a 70 deg. angle which provides fast cutting for general purpose work.

The punches and chisels are available in sets of five starter punches and five drift punches 3/32 to 5/16-in; five chisels 12/32 to 7/8-in; and two sizes of center punches complete in vinyl-fabric kit bags.



New Vise For Large Objects

A new vise for the industry is being offered by the De Wilde-Jones Co. This item is a screw type that clamps round, tapered or irregular objects. Its jaws consist of a series of machines or ground flat plates which hinge or swivel in any desired direction to coordinate with the shape of held object. These jaws are designed so that they can be moved in relation to each other. The work piece can rest on a contact surface underneath. No heavy torque need be applied, as the screw requires only a slight turn to grip the object.

YOU won't have to worry if you have an air-cooled EICHER Diesel Engine. There is no cooling water to freeze or cause other trouble. You will cool efficiently from the arctic to the tropics as tens of thousands of these engines are proving year after year.

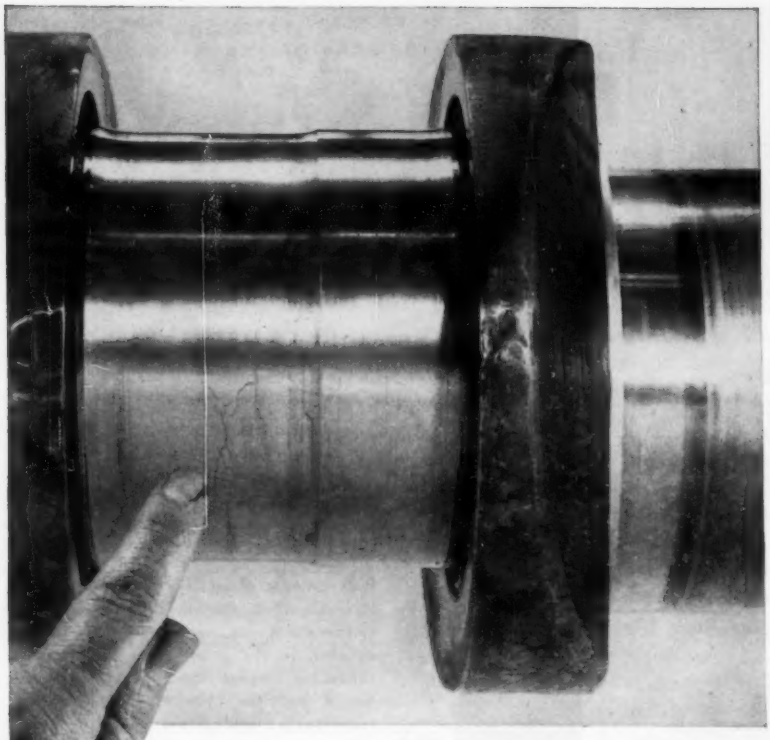
Each cylinder of an EICHER Diesel Engine is force-cooled through its own air duct. Temperatures are even from cylinder to cylinder. In the larger types, the heat is conducted through specially cast cylinder barrels and the cylinder jacket of light metal to the cooling air.

There are air-cooled EICHER Diesel Engines from 15 to 60 horsepower.

Gebr. Eicher Traktorenfabrik

Forstern/Oberbayern (Germany)

To get more detailed information, mail a Reader Service Card to DIESEL POWER for forwarding. Detailed and illustrated literature on EICHER 15, 17, 20, 24, 30, 35, 42 and 60-hp diesel engines is yours for the asking. Please give title and state any special requirements.

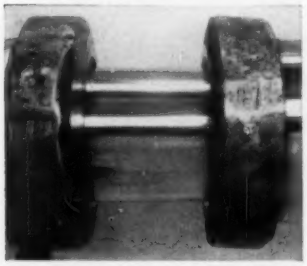


THIS CRANKSHAFT JOB NEEDS A SPECIALIST

This is specialized work, rebuilding crankshafts—intricate, exacting, and naturally expensive. It's the kind of work that demands a specialist . . . and we are just that!

We've specialized in rebuilding crankshafts, because since 1916 we've *made* crankshafts. And who knows better than a maker what are the "musts" of a sound, economical repair job. We'll take your worn crankshaft and rebuild it, if salvagable, through the carefully controlled steps of grit blasting, replating, regrinding and thorough inspection. And we'll deliver it back with a guarantee for 100% performance that only a manufacturer-specialist can provide. May we quote on your next job?

For more details on crankshaft repair write for Bulletin RC-3

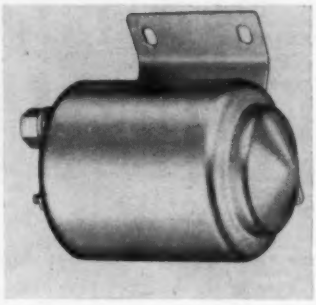


This is a finished, repaired crankshaft, after processing by National Forge.

NATIONAL FORGE
AND ORDNANCE COMPANY

Irvine (Warren County), Pa.

new products



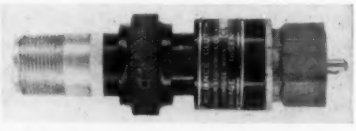
Magnetic Cranking Switches

A new line of magnetic cranking switches, featuring 6, 12, 24 and 32-volt models, has just been introduced by Leece-Neville Co. of Cleveland.

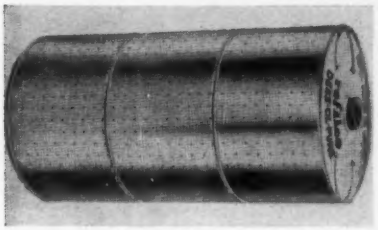
Applicable to a wide range of engines on industrial and marine installations, their standard mountings make them useful for service replacement. Contact materials have been selected for long life and ability to handle high current at the specified voltage. A special hollow plunger provides a light-weight moving assembly and makes the switch less subject to wear from vibration.

Miniature Clutch

Barbour-Stockwell, makers of precision instruments have recently brought out an improved model of their miniature clutch which makes possible the engagement or disengagement of any or all parts of power transmission drive installations. Once readings or operations have been completed, a slight turn of the control disengages the clutch until further readings are needed. Possibility of the clutch slipping is avoided by the use of positive drive, rather than depending on friction to hold it secure. Several models are available, each equipped with end fittings for insertion at any point in power transmission installations. Good solution to a troublesome problem.



new products



New Diesel Filter

Especially designed for heavy-duty compounded oils, the new 59C "Deez-O1-Pure" filter has a two way purifying action. It removes metal dirt, soot and abrasive particles which cause cylinder, ring and bearing wear.

The manufacturer says that it does not affect or remove special additive compounds of heavy duty oils. The cartridge is a perforated can 14¾ in. high and 7½ in. diameter.

Hilliard Offers New Filters

Designated the "R" series, these new oil filters feature a throwaway cartridge and easy service of the simplified three piece construction.

The "R" series Hilco Hyflow filters are especially designed for filteration of lube and fuel oils used in internal combustion engines, for oil bath air filters and for the filtration of various types of industrial oils, fuel oils, solvents and coolants.

New Grease Cutting Solvent

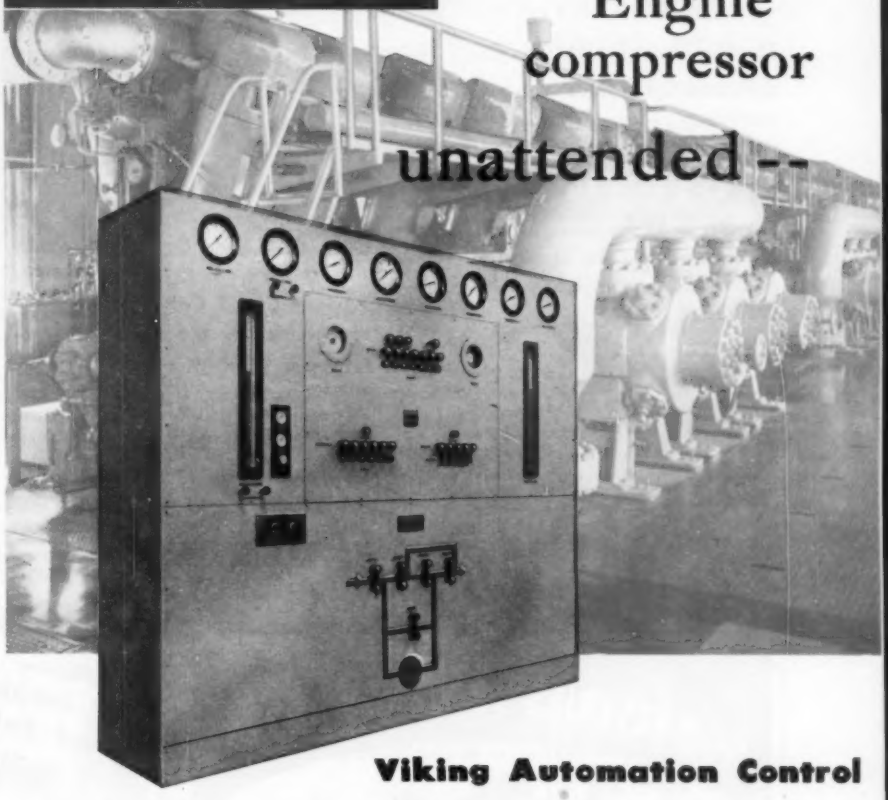
DuPont de Nemours & Co. is now marketing three types of cleaning solvents under the trade name of "Freon". Nonflammable, these solvents will remove oil, grease and dirt without harming metals parts or electrical insulation. Available in 10 to 55-gal. containers, this product can be used in open shop areas without danger of fire. In addition, says Du Pont, from an inhalation toxicity standpoint, they are rated as the safest of the commonly used solvents, when used in properly designed equipment which minimizes vapor losses.

(*Continued on Page* 68)

AUTOMATION TAKES OVER

VIKING AUTOMATIC SEQUENCE CONTROL SYSTEM

runs Giant Engine compressor unattended --



Viking Automation Control

STARTS-OPERATES-CONTROLS-MONITORS and STOPS

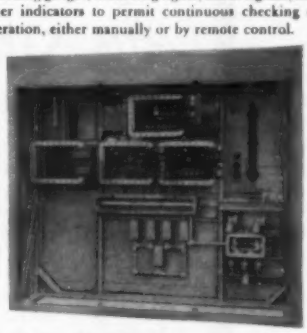
To provide an operating control system that would be completely automatic and fail-safe in starting—operating—controlling—monitoring—and stopping this 1300 HP engine compressor; Viking Instruments designed and built this automatic sequence control system for Ingersol-Rand.

Designed to permit complete, unattended, remote control operation, this Viking control system automatically operates all starting controls—brings the engine to slow speed until pressure and temperature requirements are met—then checks and loads the compressor and brings unit to full operating speed.

This control system monitors all oil, water, and exhaust-temperatures and pressures. Any abnormal condition occurring in starting or operation is instantly indicated by visible and audible alarm signals. If not corrected, the control system automatically starts the shut-off sequence by slowing engine compressor, unloading compressor and shutting down all operations.

Viking Automation engineers can design and build automation controls to your specifications, To obtain further information on this unique Viking Control System you are invited to write or call.

This control panel contains a full complement of recording gauges, indicating lights, alarm signals, and other indicators to permit continuous checking of operation, either manually or by remote control.



Rear view of control system shows circuits installed in explosion proof boxes, easily accessible for checking and servicing.

VIKING

Viking Instruments, Inc. East Haddam, Conn.

Designers — Engineers — Builders

Automation — Safety — Temperature — Pressure — Quality-Control Systems

organizational news

Electric Machinery Mfg. Co.

announces the addition to its field sales force of George Savage. A graduate of the University of Minnesota, Savage has been with the company for the past eight years. With headquarters in Minneapolis, he will focus his attention on the application and sale of the company's line of generators.

G. Savage

J. H. Reed

W. E. Johnson

Perfect Circle Corporation

announces two newly-appointed assistant sales managers. Joseph H. Reed will be in charge of the staff at PC'S Chicago office and Walter E. Johnson will head the staff in PC's Detroit office. Reed has been a sales engineer in the company's Chicago office for the past 12 years. Johnson joined PC in 1944 as an engineer in the service department.

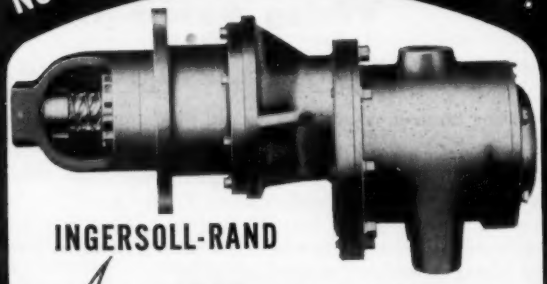
Construction Machinery Mfg's. Association

announce the election of Clarence E. Killebrew, v-p, Clark Equipment Co., as president of the Association. Boyd Oberlink, v-p Allis-Chalmers was elected first v-p and Henry Barnhart, v-p B-L-H Corp. was elected second v-p.

The 237 member companies of the Association account for approximately 95% of the dollar volume of construction machinery made in the U. S.

C. E. Killebrew

NO BATTERIES TO WORRY ABOUT!



INGERSOLL-RAND

Air STARTING MOTORS

give you trouble-free engine starts

RELIABLE—I-R Air Starting Motors are built for fast, sure engine starting—anywhere.

LOW COST—No batteries, generators or electrical parts to buy. Practically no maintenance expense.

COMPACT—I-R Air Starting Motors are lightweight, small but powerful. For all popular gasoline and diesel engine sizes. Easily installed.

Ask your engine distributor to show you the I-R Air Starting Motor line. Or write for Bulletin 5094A.

18-512

INGERSOLL-RAND

11 Broadway, New York 4, N.Y.

Intake and Exhaust NOISE

Pipe System PULSATION

Stopped with

BURGESS-MANNING SNUBBERS

The Burgess-Manning Snubbing Principle has been engineered to effectively eliminate the costly and nerve-racking problem of noise and pulsation. We have, for many years, specialized in the science, cause and effect of noise and pulsation problems. We have adapted the Burgess-Manning Snubbing Principle to many and varied problems in every branch of industry to increase production, minimize maintenance, eliminate this serious source of compensation claims and improve public and employee relations. Burgess-Manning Snubbers are available with such plus features as: air cleaning—or, spark arresting—or, surge control—or, water separating—or, heat recovery.

Let us engineer your noise and pulsation problems right out of existence.

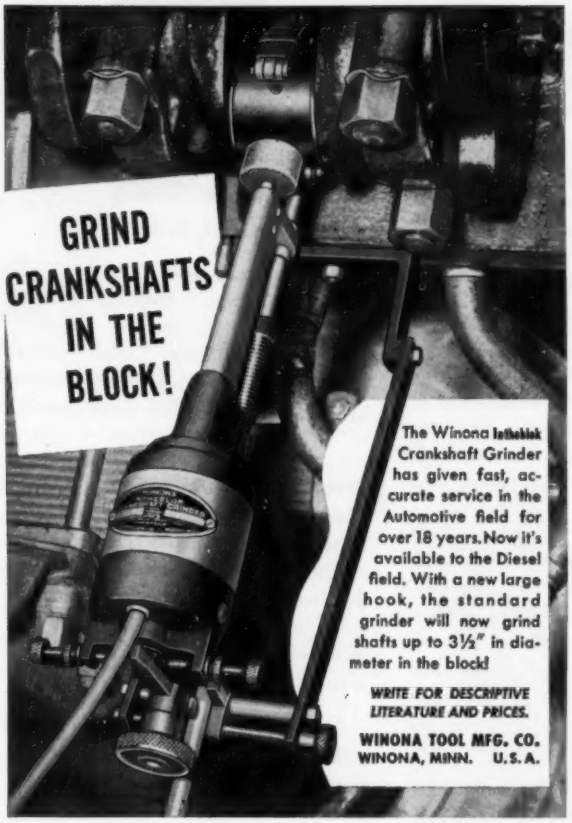
Write for Case Histories.

BURGESS-MANNING COMPANY

Sound Engineering

751 East Park Avenue, Libertyville, Illinois

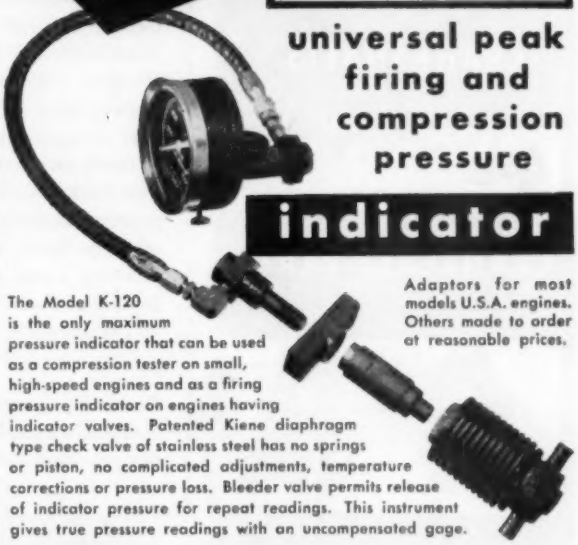
Dallas, Texas


GRIND CRANKSHAFTS IN THE BLOCK!
The Winona Lethelok Crankshaft Grinder has given fast, accurate service in the Automotive field for over 18 years. Now it's available to the Diesel field. With a new large hook, the standard grinder will now grind shafts up to 3½" in diameter in the block!
WRITE FOR DESCRIPTIVE LITERATURE AND PRICES.
WINONA TOOL MFG. CO.
WINONA, MINN. U.S.A.

KIENE®

MODEL K-120

universal peak firing and compression pressure indicator



The Model K-120 is the only maximum pressure indicator that can be used as a compression tester on small, high-speed engines and as a firing pressure indicator on engines having indicator valves. Patented Kiene diaphragm type check valve of stainless steel has no springs or piston, no complicated adjustments, temperature corrections or pressure loss. Bleeder valve permits release of indicator pressure for repeat readings. This instrument gives true pressure readings with an uncompensated gage.

Adaptors for most models U.S.A. engines. Others made to order at reasonable prices.

KIENE DIESEL ACCESSORIES, INC.
10352 PACIFIC AVE. FRANKLIN PARK, ILLINOIS

organizational news

R. D. (Roy) Adams

Clayton Manufacturing Co. announces the appointment of R. D. (Roy) Adams as Director of Sales for the Steam Cleaner, Dynamometer and Chemical Divisions of the company. Adams will succeed Walter Wood, who will take over as Regional Manager for 11 western states. Associated with Chansolor & Lyon Co. more than 30 years, Mr. Adams is well known in automotive circles.

Consolidated Diesel has named Air Marshall Robert Leckie RCAF, retired, as their representative in Canada of the company's wholely owned Canadian subsidiary.

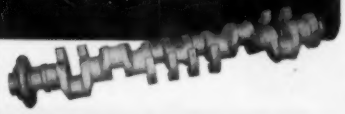
When you install Vikings, there's no wasted time with slow, uncertain priming . . . you start delivering in seconds. Delivery is then smooth and constant. There's no spasmodic operation to cause damage to valves and meters. And to finish, you can strip a tank fast and completely with positive Viking Rotary Pumps. They are built to pump all liquids, thick to thin.

To start, send today for pump catalog 57Sd.

VIKING PUMP COMPANY
Cedar Falls, Iowa, U.S.A. In Canada, it's "ROTO-KING" pumps
See our catalog in Sweets

Park DIE-FORGED

CRANKSHAFTS



CRANKCASE PARTS

CONNECTING RODS

Are the Strongest "Links" in your Power Transmission Chain

For over 49 years, Park has specialized in the closed-die forging of crankshafts, connecting rods, camshafts, crankcase parts, main bearings, gears, pinions, axles and steering knuckles.

Park's facilities include a complete die sinking shop, modern specialized heat treating equipment and experienced metallurgical and engineering staffs.

Die Forging Specialists Since 1907

THE PARK DROP FORGE CO.
CLEVELAND 3, OHIO

CARBON, ALLOY AND STAINLESS STEEL CLOSED-DIE FORGINGS FROM 4 LB. TO 5000 LBS.

organizational news

Cooper-Bessemer's
General manager, Eugene Miller has announced the elevation of E. C. Phelps to works manager of the Mount Vernon plant, H. C. Johnson to manager of manufacturing and C. W. Gilchrist to assistant works manager. As new works manager, Phelps fills the position formerly held by Peter Letz, who has taken on the assignment of directing a major expansion program by C-B at their Mount Vernon, Ohio and Grove City, Pennsylvania plants.

Clark Equipment Company
announces a newly created position on the president's staff, that of coordinator of manufacturing operations. Claud A. Fenn, vice president has been appointed to fill this job. Starting with Clark in 1934, Mr. Fenn has held positions as plant manager, manager of division sales, prior to being made vice-president covering these operations.

H. Singleton

Robertshaw-Fulton Controls
has appointed Horace Singleton, special assistant to the general manager, to the position of assistant vice president of the company.

With the company since 1933, Singleton was formerly sales manager and contract administrator of the company's Aeronautical Division.

Robertshaw-Fulton Controls
announces the acquisition of the Acro Manufacturing Co. Acro, a manufacturer of electric switches will become a division of Robertshaw-Fulton and will continue operations under present management and staff.

J. S. Derby

Alco Products, Inc.
have named John S. Derby as director of labor relations for the company. Derby will administer, under the vice president, Alco's labor policy and coordinate that policy on related matters.

Plomb Tool Company
Stockholders have approved a change in the corporate name. To be known in the future as Pendleton Tool Industries, Inc., the parent company located in LA will operate under the name of Proto Tool Co., as the division of Pendleton Tool.

Alcoa Aluminum
has made known the retirement of Donald I. Bohn, manager of special electrical development engineering. During his career with Alcoa, he obtained over 15 patents in the electrical field, wrote many engineering articles and was very instrumental in the development of the Nordberg radial engine for the Company's Port Comfort, Texas plant. In recognition of his many contributions to engineering, Mr. Bohn received the Lamme Gold Medal, one of the highest honors of the AIEE.

Ross Heat Exchanger Division
recently expanded their sales department with six new appointments. Paul W. Wilcox has been made sales manager, George G. Van Tuyl, Mgr. of Power Equipment Sales, Marvin F. Schobert, Product Mgr., Standard Exchangers and Richard J. Riedl, Product Mgr., Engineered Navy and Atomic Exchangers.

As Sales Manager, Mr. Wilcox with Ross since 1944, will work closely with the regional managers of power equipment sales as well as the company's 11 district sales offices and 15 sales representatives.

organizational news

A. J. Marcussen

Electro-Motive Division of General Motors
has named Arthur J. Marcussen to district sales representative for the Chicago region.

Coming to E-M-D in 1947, Marcussen started as a service operating instructor, later becoming an instructor in the diesel training center.

The Garrett Corporation
in a report to stockholders reported sales of $86,067,000 for the six months period ended December 31, 1956. This figure compares with $62,457,000 for the same period during the previous year.

Harrison Radiator Division
has made known the appointment of Claude V. Hawk as assistant chief engineer. A veteran of 25 years of service in the U. S. Navy, Mr. Hawk saw action as executive officer and commanding officer of a destroyer during World War II.

Allis-Chalmers Manufacturing
announces the election of Boyd S. Oberlink, group vice president, to the firm's Board of Directors.

Starting with A-C in 1934, shortly after graduating from the University of Illinois, Oberlink has held a number of executive positions with the company.

He will succeed Rex Reeder, who is retiring from the board.

Detroit Diesel Division of General Motors Corp.
announces that Griffin Equipment Corp. of New York City, has been appointed exclusive territorial distributor for the company's marine engines. This appointment is in addition to their exclusive distributorship of Detroit's industrial engines, which Griffin has held for many years.

Gould-National Batteries Inc.
has made known the appointment of George R. Powers, Jr. as St. Louis regional manager of the industrial division.

Powers, a graduate of Pace College in New York has recently served as specifications engineer and export manager for the company's New York office.

With headquarters in St. Louis, Powers will expedite the selection and servicing of industrial batteries covering eight states in the central western area.

J. S. Hudson

Electric Storage Battery Co.
has named J. S. Hudson, asisstant secretary as corporate director of industrial and public relations.

Hudson, an electrical engineer and an attorney is a member of the Cleveland Chamber of Commerce and the Ohio Bar Association.

FUEL INJECTION EQUIPMENT DIVISION
of
LUCAS ELECTRICAL SERVICES, INC.
Head Office: 653 Tenth Avenue, New York 36, New York
Sales Office: 14820 Detroit Avenue, Cleveland 7, Ohio
West Coast: 5025-29 W. Jefferson Blvd., Los Angeles 16, California
Canadian Distributors:
Joseph Lucas (Canada) Ltd., Head Office: 11 Davies Avenue, Toronto 8, Ontario
Branch Office: 3401 St. Antoine Street, Montreal 30, Que.

A.P. 174817

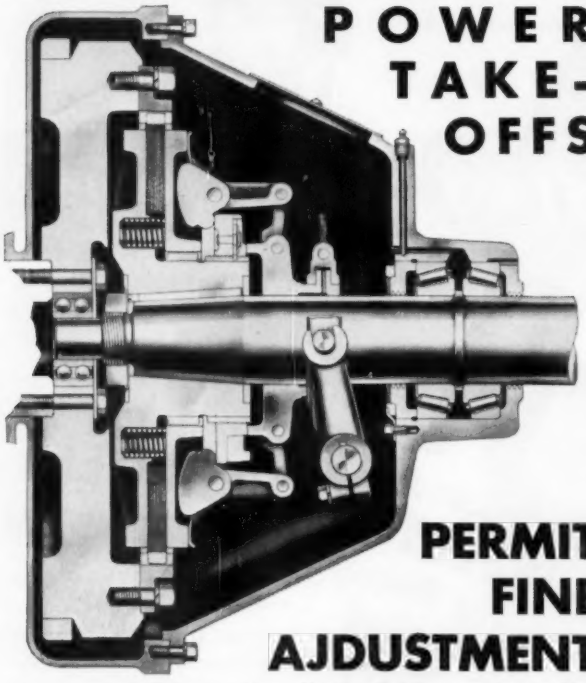
new literature

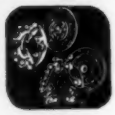
Gardner-Denver
has published a 16-page bulletin showing a complete line of small air cooled compressors for industrial, automotive, commercial and general use. It contains a chart for figuring compressors needs and another showing estimated free air consumption for 30 common shop jobs.

Arc Welding Information
is given in the new electrode data book released for publication by the National Cylinder Gas Company. Continuing information on ASW-ASTM arc welding, electronic specifications and a summary of welding symbols, this catalog should be of interest to users of arc welding.

ROCKFORD

POWER TAKE-OFFS




Small Spring Loaded

Heavy Duty Spring Loaded

Oil or Dry Multiple Disc

Heavy Duty Over Center

Power Take-Offs

Speed Reducers

PERMIT FINE AJDUSTMENT

SELF CONTAINED UNIT
WIDE RANGE OF SIZES
CONSERVATIVE RATING
ROLLER BEARINGS
FINE ADJUSTMENT *
ACCURATE BALANCE
S.A.E. DIMENSIONS

An adjustment ring provides for infinitely close adjustment, without special tools. Fine adjustments can be made, and automatically maintained, without releasing or engaging separate locking devices which formerly limited adjustments to spacing of notches or holes.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.

BW

ROCKFORD Clutch Division BORG-WARNER
1301 Eighteenth Ave., Rockford, Ill., U.S.A.
Export Sales Borg-Warner International — 36 So. Wabash, Chicago 3, Ill.

CLUTCHES

Cerlist Diesel, Inc.
has issued a new four-page booklet on their new JW-78 diesel portable and stationary compressors.

Hartford Machine Screw Company
manufacturers of Roosa Master fuel injection pumps have released a new directory of their authorized sales and service agencies around the world.

Wire Rope for Construction Equipment
is discussed in a new brochure being offered by the Macwhyte Co. By means of photographs and drawings, this publication lists the proper wire rope specifications for all types of construction equipment.

Parker Appliance Co.
manufacturers of hydraulic and fluid system components is offering a new catalog discussing their full line of Triple-Lok tube fittings. Included are new type swivel nut type and straight threaded fittings with o-rings for SAE thread boss.

Diesel Control Corporation
has recently made public a catalog containing descriptions, prices and illustrations of diesel testing equipment. Among the products described are governor test stands and nozzle repair stands.

Wall Chart of Conversion Factors
Precision Equipment Co. is offering a wall chart of conversion factors, to the industry. Included are common factors such as inches to centimeters, watts to hp, cu ft to liters, as well as many other conversions which are difficult to find in reference manuals.

Buying a Used Machine Tool?
A new booklet on "How to Buy a Used Machine Tool", a primer for the interested buyer, has just been published by S & S Machinery Co. Written in question and answer form, the new booklet covers aspects of used machinery purchase. It goes into such questions as what test equipment to bring with you, the pros and cons of buying as-is, reconditioned or rebuilt equipment.

new literature

Grinder Tools
An eight-page, photo illustrated bulletin describing the features and advantages of the new Walker-Turner grinder line is being offered by the Rockwell Mfg. Co.

Air Maze Liquid Filters
are described in the new 15-page bulletin recently released for the industry. Pictures, illustrations and specifications are among the items covered in the publication.

South Bend's Entire Line
of precision machine tools is illustrated and priced in their new 80 page catalog. This catalog should be of interest to anyone responsible for the selection or use of machine tools.

New Allis-Chalmers Tractor
is described in a new 16-page catalog being offered by the Construction Machinery Div. of A-C. Text, pictures and illustrations help tell the story of the TS-360.

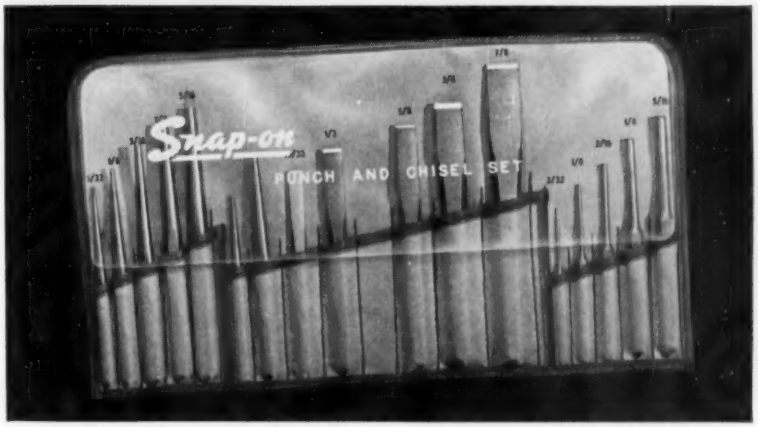
Alco's Line of Export Diesels
is described in new two-color bulletin just released by the company. Included in the publication is information on Alco's new 251 series of three diesel engines, which power all of the locomotives.

ASTM Standards on Petroleum
products and lubricants have been compiled into a 1096-page book by the Society. Published annually since 1927, the present edition includes 180 standards, 48 of which are new or revised since the previous edition.

General Electric's Line
of industrial locomotives is discussed in their recently released booklet. The publication GEA-6332 is the second in a series of five which are designed to aid the prospective purchases of industrial haulage. The operating conditions and performances of 14 switcher-type locomotives are outlined in the illustrated booklet.

Cut Clean, Punch True with These New, Extra Tough...

Snap-on CHISELS and PUNCHES



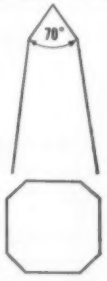
Snap-on set No. PC-170-K contains five starter punches and five drift punches 3/32 to 5/16 in.; five chisels 13/32 to 7/8 in.; and two sizes of center punches. Sizes are clearly marked on protective kit bag as illustrated.

This new *Snap-on* chisel and punch set contains the basic tools to handle a wide range of jobs. A mechanic can select the right chisel, starter punch or drift punch to get cleaner, more exact results, longer tool life.

Here is why experienced mechanics prefer *Snap-on:*

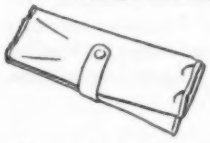
Special Steels scientifically heat-treated for long life. High silica, manganese, molybdenum steel is heat-treated under controlled atmosphere for uniform hardness. Chisel and punch heads are then induction-drawn to reduce hardness to just the right degree. The result is a controlled-mushrooming, long-life striking surface.

70-Degree chisel edge cuts better, stays sharp longer. Exhaustive tests by *Snap-on* engineers show that by shaping cutting edge to a 70-degree angle, the chisel cuts better, stays sharp longer.



New Octo-Square shape for firm, comfortable grip. *Snap-on* chisels and punches are square shaped with beveled corners to give user a better, more comfortable surface for firm control, greater safety, and prevent tool from rolling out of reach.

New-Style hold-tight kit bag. New kit bag folds easily — has a transparent flap which keeps tools from dropping out.

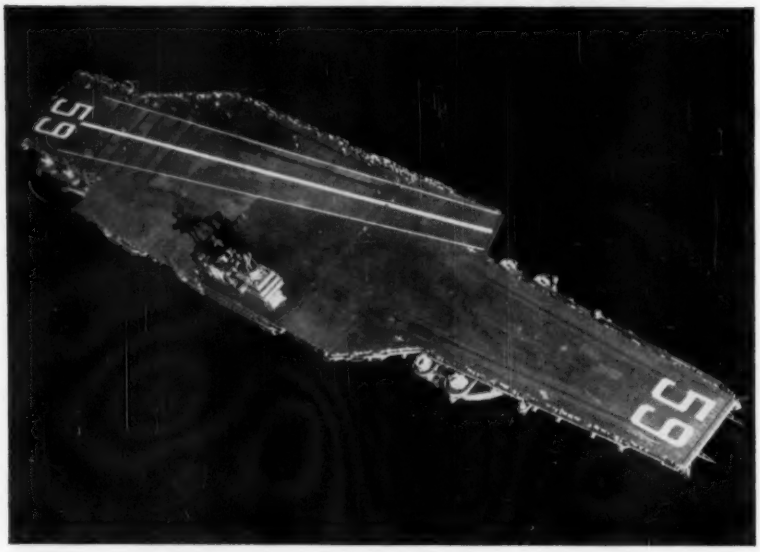


This chisel and punch set is one of many fine *Snap-on* tool sets. The *Snap-on* representative who calls on you can show you a complete range for production or maintenance work.

*Snap-on is the trademark of Snap-on Tools Corporation.

SNAP-ON TOOLS CORPORATION
8064-C 28th Avenue • Kenosha, Wisconsin

Beneath the Forrestal's flight deck...



DETROIT CONTROLS

contribute to the health, comfort and safety of her personnel

Photos courtesy of Newport News Shipbuilding & Drydock Co.

Just as the planes land with confidence on her broad flight deck, so the men who man her depend for their comfort and safety upon her structure and operation below decks.

Here Detroit Controls play a key part—controlling the air conditioning and refrigeration systems and sounding the alarms for overheating or low lube oil pressure.

For nearly 30 years, Detroit Controls has supplied pressure and temperature controls for Naval and marine vessels. These specifically designed controls limit, regulate or guard pumps, diesel engines, heating and air conditioning systems, lube oil temperature and pressure alarms, desuper-heaters, clutches and other marine installations.

For complete information, write for Catalog 100.

5900 Trumbull Avenue
Detroit 8, Michigan

DETROIT CONTROLS
CORPORATION
Division of AMERICAN-Standard

new literature

P & C Tool Co.
offers their new 20-page catalog illustrating each of the company's more than 800 hand tools.

Allis-Chalmers
have made available to the industry, a new 16-mm color sound movie describing the reversible pump-turbine. Running 17 minutes, "Captive Kilowatts", tells how pump turbines function to help utilities provide economical electric power.

Weatherhead Company
announces the publication of a new 48-page steel tube fittings catalog. The new catalog incorporates complete engineering data on hydraulic tube fittings and, in addition, has complete engineering specifications with a section devoted to assembly instructions, finishes and operating pressures.

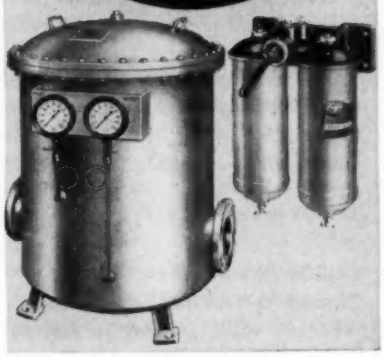
Century Gas Equipment Co.
of California has made available a 4-page folder discussing the reducing of fork lift operational costs with LP-gas engines. Covered are fuel oil advantages of LP-gas and maintenance cost reductions. The folder also includes illustrations and applications of fork lift LP-gas equipment.

"Rocking Contact" Voltage Regulator
is the title of a new bulletin just released by Allis-Chalmers. Construction and operating features of this product for ac generators up to 25,000-kva are described.

Two New Booklets
illustrating and describing the Superior No. 17 spreader and the Superior No. 100 power take-off spreader have been released for the industry by Oliver Corp.

Industrial Cooling Towers
by Pritchard are described in their recently released 15-page booklet. Complete with specifications, drawings and illustrations, this publication will be of interest to anyone with cooling problems.

WHY you can rely on Fulflo FILTERS



for micronic clarity of fuel and lubricating oils

Typical of Fulflo's pioneering "firsts" was the application of a *full-flow* lubricating oil filter to a high horsepower diesel engine. Today, Fulflo provides micronic clarity of both lubricating and fuel oils, on *all* horsepower stationary engines, mobile equipment, and in bulk filtration. You can rely on the filter that "grew up" with the diesel industry.

One of Fulflo's *exclusive* advantages is the Honeycomb Filter Tube. It gives you true *depth* filtration to any desired degree of micronic clarity. Fulflo will *not* remove additives. For replacements, always insist on *genuine* Honeycomb Filter Tubes.

Commercial Filters products also include a complete line of CFC (formerly Honan-Crane) Filters. They employ a variety of filter media such as Cranite (Fuller's earth) for removal of soluble contaminants as well as abrasive particles. Inexpensive Michiana Filters, with "throw-away" or repackable elements, are also available.

Commercial Filters Engineers will quickly demonstrate how you lower costs by prolonging engine life. For technical literature write to Department DR

COMMERCIAL FILTERS
CORPORATION
MELROSE 76, MASSACHUSETTS

Plants in Melrose, Massachusetts and Lebanon, Indiana

news of our industry

(*Continued from Page 53*)

Argentine Government Buys Diesel-Electric Locomotives

Fifteen standard diesel-electric locomotives have been purchased from General Electric by the Argentine Government. These units, bought at a cost of more than $1 million, will provide a link between docks of Buenos Aires and freight terminals of the Argentine State Railway. GE will begin shipment of the 65-ton units next fall.

Purchase of these locomotives is part of an extensive expansion and modernization of Argentina's railroad service. In the early part of 1956, they bought 25 diesel-electrics for mainline duty.

Student Engineer Program Inaugurated

A program similar to that proposed by the Fairchild Eng. Div., would help to relieve the shortage of quality engineers in the diesel field. The object of the program is to combine, in five years, four years of college education and two years of actual experience in the industry. Students will work for alternating periods at the plant in one of the engineering groups with classroom work at one of the participating engineering schools.

Cummins To Build Plant in Scotland

The Cummins Engine Company, Inc. of Columbus, Indiana has announced plans to establish a plant for the manufacture of its diesel engines at Shotts, Scotland. The new company, to be known as Cummins Engine Co., Ltd. will be a wholly owned subsidiary of the American company.

An existing building containing approximately 150,000 sq. ft. is being leased, and a total investment of approximately $500,000 is planned. The first portion of the plant is expected to be in operation in about two years and will employ 450 people, ultimately, the completed factory will employ some 800 people.

HERE'S a *Faster* way to clean Heat Exchangers

No need for resorting to laborious disassembling and hand-cleaning when your heat-exchangers become clogged. Now, you can clean them *in place* the modern Oakite way by merely circulating a solution of specialized Oakite detergent through the tubes and shell! The soil is *chemically* removed—faster and more economically than any old-fashioned hand method. Check these other advantages:

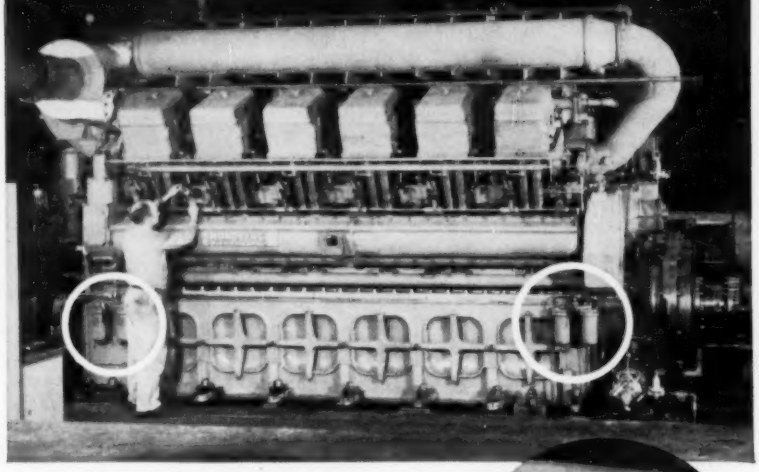
- ★ Thorough soil removal
- ★ Cleaning action reaches all areas
- ★ Less wear and tear on units
- ★ Reduces unit down-time
- ★ Makes man-hours more productive
- ★ Reduces consumption of fuel and cooling water

Your local Oakite Technical Service Representative will be glad to give you more details. Call him today—or send for your FREE copy of illustrated pamphlet F9442. There's no obligation. Write Oakite Products, Inc., 22C Rector Street, New York 6, N. Y.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

Technical Service Representatives in Principal Cities of U. S. and Canada

NUGENT FILTERS
provide positive protection for Nordberg Diesels in rugged towboat service

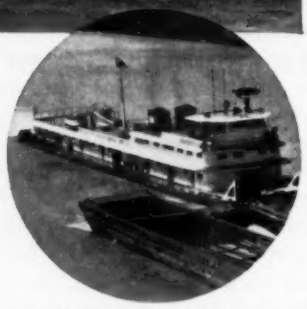


The four most powerful twin screw towboats ever to enter river service each derive main propulsion power from a pair of Nordberg *Supairthermal* 4-cycle Diesel Engines.

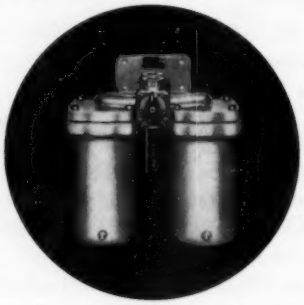
Nugent Duplex Filters were selected to provide these engines with efficient, economical filtration. Both the fuel oil system and lube oil for the supercharger get the positive protection of Nugent Laminated Disc Filters . . . which remove foreign particles as small as 2 microns.

Because valuable equipment demands this kind of protection, leading diesel manufacturers choose NUGENT FILTERS. A wide range of sizes and types are available to meet the most exacting requirements. Size for size, they provide 20 times more filtering area than any other filter. Full or by-pass filtering is possible with the same unit and simple piping makes installation easy.

For longer life and better service from your diesel . . . look to Nugent. Write today for complete information.



The Nordberg Supairthermal Engines powering this towboat are equipped with Nugent Filters.



Filters installed on the Nordberg Diesels are Nugent 1555BF-1R Laminated Disc type.

Established 1897 TRADE MARK

Wm. W. Nugent & Co., Inc.

3426 Cleveland Street Skokie, Illinois

OIL FILTERS, OILING AND FILTERING SYSTEMS, TELESCOPIC OILERS, OILING DEVICES, SIGHT FEED VALVES, FLOW INDICATORS

Representatives in Boston • Cincinnati • Detroit • Houston • Los Angeles • Minneapolis • New Orleans • New York • Philadelphia • Portland, Oregon • San Francisco • Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

news of our industry

(*Continued from Page* 65)

REA To Hold 8th Annual Conference

April 8, through April 11, 1957 are the dates set up for the eighth annual REA Electric Generating Plant Operation and Maintenance Conference. This is to be held at the Phillips Hotel, Kansas City, Missouri.

Sessions on diesel and steam plant operation and maintenance will be in progress as in the past.

This conference is not restricted to REA cooperatives entirely. The Committee wishes to invite any municipality or utility that desires to attend.

67,000 Roadbuilders Throng '57 ARBA Road Show

Staged within Chicago's International Amphitheatre, on an area equivalent to 12 football fields, the ARBA Road Show proved to be the largest industrial exposition ever assembled under one roof.

Twelve million dollars worth of equipment was on display representing the products of 250 manufacturers of equipment and 60 producers of highway materials and supplies.

The 67,000 highway contractors, officials and engineers attending saw a display of diesel shovels, cranes, tractors and related equipment.

Minneapolis-Moline Expands Industrial Sales operations

A major expansion of industrial sales operations and staff at M-M has been announced by R. R. Greenwalt V-P-Sales with the appointment of a national sales staff, headed by E. A. Henry, manager of the firms Industrial Power Division.

The Company has increased the number of models of utility and industrial tractors, engine and power units. Eight models for lighter fuels and two diesel models of industrial engines are also in production, along with two additional models of diesel engines will be available during 1957.

news of our industry

Cummins Diesel Powers New Design Tractor

Wagner Tractor Inc. announces a new 40,000-lb tractor with dual controls and a reversible driver's seat. Powered by a 200-hp Cummins diesel engine using a twin disc torque converter, the machine can attain a road speed of 17-mph.

This particular model is designed for heavy construction, where ruggedness and time saving are a profit factor. The operator never needs to waste time in turning the vehicle around, but swings the seat around and drives back in the direction from which he came. The fact that he does not have to back up is also a safety factor, as noted by the Wagner Co.

Nordberg Engines Overseas

Four Nordberg two-cycle diesel engines were recently placed in service by the Instituto Costarricense de Electricdad of Costa Rica. These nine cylinder engines of a 21½" bore and a 31" stroke and will develop 4167 hp.

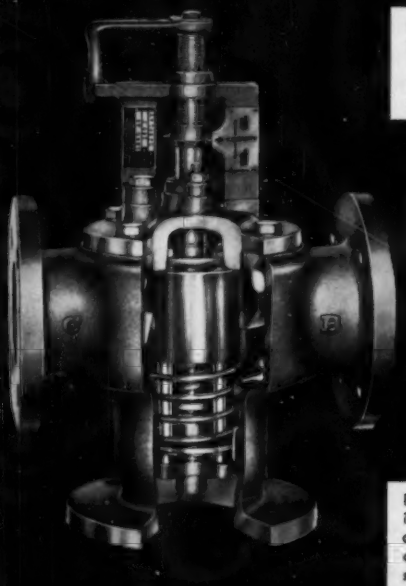
The Montecatini Chemical & Mining Co. of Milan, Italy is installing four Nordberg 16 cylinder spark-ignited engines in their 10,000 kw generating plant. Each engine is rated 3560 hp at 500 rpm.

New Gas Pipeline To Require 56,950-HP Compressor Capacity

The Federal Power Commission has authorized El Paso Natural Gas Company of El Paso, Texas to construct gas pipeline facilities, requiring 56,950-hp in compressor capacity. This of course will mean extra business for manufacturers of gas driven compressors. The project will include a total of about 290 miles of pipeline on El Paso's system in Texas, New Mexico and Arizona.

ALL-IN-ONE CONTROL FOR HIGHER ENGINE EFFICIENCY

By controlling cooling water or lubricating oil temperature, this Sylphon Engine Control guarantees the engine temperature you need for maximum operating efficiency—minimum fuel consumption. And best of all, it detects temperature changes and adjusts valve openings as *one complete unit—from one location.*



POWER-PILL* fusion-type thermal element provides powerful response to temperature changes only. Not affected by pressure.

Tamper-proof . . . factory set for any specified operating temperature between 120° and 190°F.

Entire operating mechanism lifts completely out of the valve body. No breaking of pipe connections if servicing is ever required.

Protected against damage in case of temperature over-run. Simple, rugged construction minimizes servicing and maintenance.

SYLPHON ENGINE CONTROL
No. 1280 shown here has manual operator, No. 1281 does not. Manual operator over-rides thermal element and permits valve to be opened or closed at any time.

Valve body and other parts are corrosion-resistant. Valve sizes 2" through 6", pressures to 150 psig.

*TRADEMARK

SEND TODAY FOR BULLETIN D-ED

Mr. Controls

Robertshaw-Fulton
CONTROLS COMPANY

FULTON SYLPHON DIVISION • Knoxville 1, Tennessee

new products

(*Continued from page 57*)

Retail Farm Equipment Convention, January 16

Omaha, Nebraska will be the setting for the annual convention of the Mid-West Retail Farm Equipment Association.

Bon D. Gussing, director of merchandising, Minneapolis-Moline Company will be the main speaker. The Mid-West Association includes members from the states of Nebraska, Iowa and parts of South Dakota, Kansas and Colorado.

Because of the increasing number of farm tractors being sold, and the biggest percentage of them being diesel driven, this convention should be of interest to the diesel industry.

Prefab Heater-Cooler Unit

This heater-cooler unit, made by Union Diesel Engine Co., is an example of cost-cutting by means of prefabricated assemblies. Piping is done at the factory, reducing installation time. The unit includes two motor-driven pumps, two temperature regulating valves, and two tube-and-shell heat exchangers all mounted on fabricated steel sub-base. Size, equipment features and characteristics are custom designed to meet specific requirements.

Graybar Introduces Power Unit Line

Garybar Electric Co. has made available to its customers, a complete line of gasoline, LPG and diesel engine-driven power plants. Produced by Winpower Mfg. Co., the sets are available up to 100 kw. Larger sizes, up to 600 kw, will be made available by Diesel power plants. Because of the wide range of sizes, this new line provides a unit for all portable power needs or for service.

High-Volume Dust Collector

A large, cabinet-type dust collector is now being made by Torit Mfg. Co. The model 123 is made to handle heavy-duty continuous grinding and other high-dust-volume sources. It handles as many as eight grinding wheels at a time, has a dust capacity of 10-cu ft, a filter area of 300-sq ft, and a 5-hp motor that moves 2000-cu ft of air per minute.

Electric Bond Crack Repair

The Mogul Electric Bonder repairs some cracks in cylinders in as little as ten minutes. The crack is chiseled clean, and pure nickel is deposited on it. Weld is then peened and ground, and put into service without removing the engine.

Engine Preheater

Cold weather freeze-up and hard starting are said to be eliminated with the new Zero-Start preheater being offered by the Phillips Mfg. Co.

Available for heavy-duty trucks and heavy equipment, this unit operates off any 115-volt ac or dc current. Circulating coolant within 20 seconds, the heater moves warm water throughout block.

FREE to Every Shop Operator

- Diesel Compression Testers
- Nozzle Testers for American Bosch, Caterpillar and Bendix Nozzles
- Cummins Injector Tester
- International Harvester Injection Testers
- General Motors Injector Testers
- Injection Pump Calibrating Stands
- Nozzle-Injector Cleaning Tools and Lapping Blocks
- Engine Overhaul Stands
- Engine Removal and Parts Dollies
- GM 71 Engine Tools

76 Pages—275 Illustrations
56 Engine Reference Tables
26 Parts Lists

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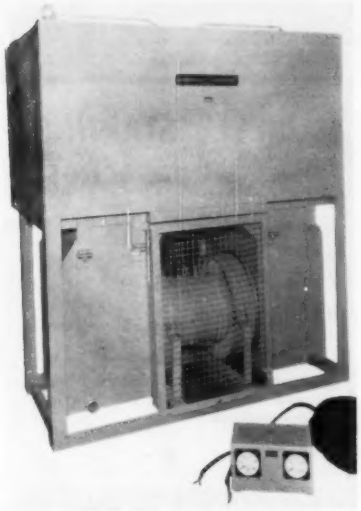
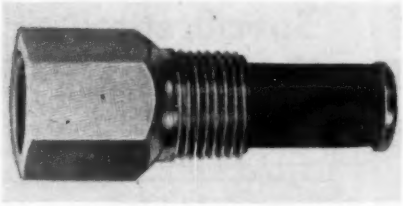


New Diesel-Electric Resistor

The Locomotive and Car Equipment Department of GE have made available an engine loading resistor that features a higher capacity, simplified design and a portable meter box.

This new product can test large diesel-electric units used for railroad service. Capable of absorbing up to 3000-hp, it has a capacity of 6000 amps. Circuit changes are made with a single four-pole double-throw switch, eliminating the possibility of burnouts caused by incorrect switch positioning.



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A new immersed-type check valve for air systems that installs directly into air reservoir tanks is being offered by Berg Mfg. of Chicago. Permitting air to flow in one direction only, this valve with rubber compound sleeve is said to be unaffected by oils, alkalis, most acids and moisture. Remaining flexible from minus 40° to 225°, the valve is available in ¾ in., ½ in. and ⅜ in.

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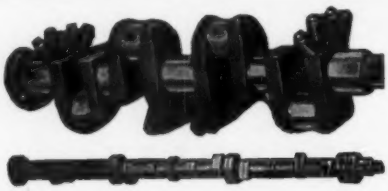

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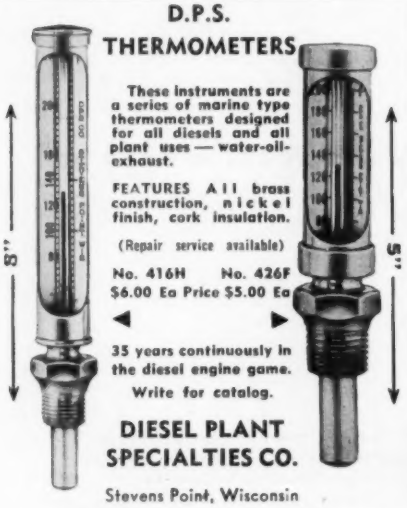

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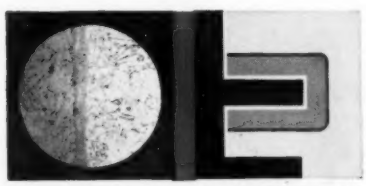

Photomicrograph of Bi-metallic Molecular Bond

Enlarged Cutaway of Ni-resist Armored Ring Band

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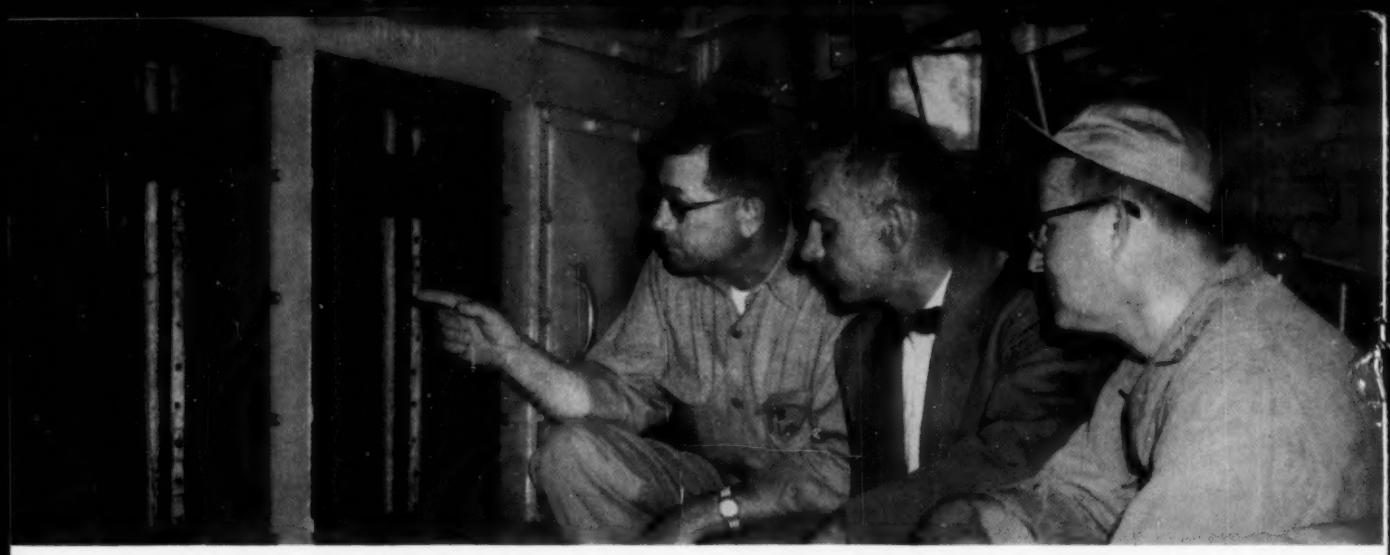

(l. to r.) Carl Olbertz, Milford plant superintendent, "Rollie" C. Bleimehl, Standard Oil industrial lubrication specialist and Frank Morgan, Milford chief engineer inspect crankcase. Rollie Bleimehl is qualified to give technical service on jobs like this. He's been doing this sort of work for 10 years. Rollie has a mechanical engineering degree from Iowa State College and has completed the Standard Oil Sales Engineering School.

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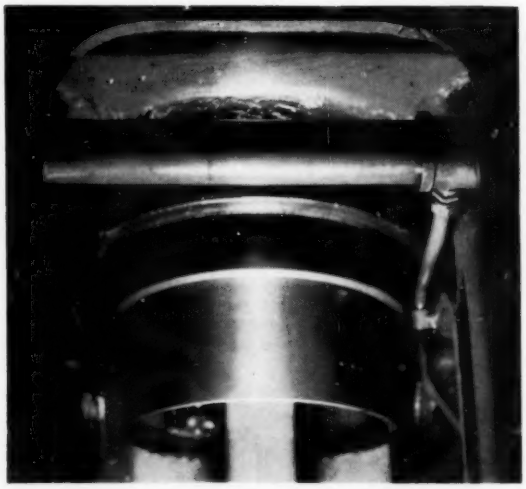

"As is" photo of piston skirt and interior of crankcase. No wiping or cleaning was done before photographing or at any time during 23,232 hours engine has been in service. STANODIESEL Oil M is the lubricant.

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